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AGRICULTURAL CREDIT

ACCESS TO AGRICULTURAL CREDIT
IS ESSENTIAL FOR IMPROVING
AGRICULTURAL PRODUCTIVITY AND
RURAL STANDARDS OF LIVING.
(PHOTO: FAO -- S. LARRAIN)

Cooperatives and Credit—A Re-examination

B. J. Youngjohns

[Cooperatives in the Third World have been instruments of government policy rather than business-minded organizations servicing members. A common type of cooperative is the single-purpose farm credit society, which is often a losing business proposition. Credit unions and multipurpose cooperatives have done much better.]

Within the Third World, the modern cooperative movement originated in India around the turn of the century. Although other types of cooperative were considered, a conscious decision was taken by the British authorities to give first priority to agricultural cooperative credit societies loosely based on the Raiffeisen model in Germany. The Rochdale system of consumer cooperatives, which had been quite successful in Britain since 1844, was specifically rejected as being more suitable for urban than rural conditions and as too sophisticated for India at that stage. The Cooperative Credit Societies Act of 1904 provided only for cooperative credit societies. The Cooperative Societies Act of 1912 permitted the registration of other types of cooperative, and became a model for cooperative legislation throughout the (then) British dependencies and in many other countries as well. It set the pattern of a cooperative movement under the supervision of a government department, headed by a Registrar of Cooperative Societies, and established a tradition of viewing cooperatives not so much as worthwhile in themselves or to their members but as instruments for public policy. This "instrumental" approach to cooperatives has persisted and has spread throughout the world, having been taken up by postindependence national planning and development offices, and by the bilateral and international aid agencies.

Mr. Youngjohns is deceased. He was with the British Ministry of Overseas Development, London.

The central contention of this paper is that, no matter how worthy a government's intentions, the instrumental approach to cooperatives is mistaken and is the root cause of failure and disappointment. It misconstrues the fundamental principles on which a cooperative is based. The allegation sometimes heard that the colonial power uncritically tried to transplant an organizational form from industrial Britain to rural India and Africa misses the point altogether. This is precisely what they did not do--if they had done so, the result might well have been better. To develop this argument, it is necessary to look again at some of the basic defining principles.

A Cooperative Is a Business

A cooperative is a voluntary, democratically controlled association of people with the purpose of conducting some kind of business. Voluntary associations are established for all kinds of social, political, cultural, recreational, or defensive purposes; a cooperative differs from others in being an association especially set up to go into business. Once established and registered, the cooperative becomes a body corporate, with perpetual succession, and it belongs to the class of business firms.

The distinguishing feature of a cooperative business is that it is owned by its members who are either its customers, or, in the case of production cooperatives, its employees. Concentrating on the former for the sake of clarity, it follows that, since the members are the customers, the cooperative must be concerned with promoting, not only its own business interest, but that of its members as well. A balance has to be maintained between the two: a cooperative should aim to be a sound business, but not at the expense of its members; and it should promote its members' interest, but not at the expense of its own business.

Cooperatives and Profit

A cooperative is a business, and the test of success in business is profitability. It is sometimes argued that a cooperative does not make a "profit" in the usual sense. Whatever name it is given, a cooperative like any other business must make it; if it does not, it will not survive --without external support. The difference between a cooperative and a privately owned business lies in what it does with the profit once it is made. Profit or surplus in a cooperative is either (a) plowed back as reserves, or (b) distributed proportionally to members as bonus. When operated properly, this system has great economic strength. It provides for interest to be paid on capital sufficient to attract investment shares; it builds up reserves; and through the patronage bonus of a consumer cooperative, it attracts customers. If the members are encouraged to leave some of their patronage bonus on deposit, this is a further method of building up capital.

In order to be profitable in the first place, and bearing in mind the need to keep a balance between the cooperative's interests and that of its members, the cooperative should generally operate at normal market prices. The record of cooperatives in the Third World, however, shows how this basic principle has been disregarded, usually because of the government's instrumentalist approach. Marketing cooperatives have been required to operate within narrow margins laid down by marketing boards and governments, for example, while credit cooperatives have always been required to lend at artificially low rates of interest.

Credit as Business

Much of the discussion heard on the subject of credit gives the impression that it is some kind of charity or system of welfare. But credit is a commercial concept: banks offer credit because they make profits from the interest earned; merchants give credit because it increases the demand for their wares. If there is a case for "helping" small farmers, over and above what is commercially sensible, it should be done by grants and subsidies and not by credit. Credit belongs to commerce and should be practiced only if it can be made a commercial success. The real question is, then, not whether cooperatives can be used as instruments to get credit to the people, but under what conditions (if any) can cooperatives make credit into a successful business.

Single-Purpose Credit Organizations

The original cooperative introduced into India in 1904 was the Primary Agricultural Credit Society (PACS) whose sole purpose was to make loans. Later, the Cooperative Land Mortgage Banks or, as they are now called, Land Development Banks (LDB) were introduced to make long-term loans against mortgage security. In many countries, primary cooperatives do nothing else but lend money. The principle behind them is that a group of small farmers, if organized as a cooperative society, can borrow on better terms than the individuals borrowing on their own account.

After nearly a century of experience, it can hardly be denied that single-purpose credit, under *any* institution (not only cooperatives), is not good business. The record of direct government loans as well as loans through development banks, informal groups, commercial banks, as well as cooperatives, all tell the same story of overdues, defaults, and losses. In fact, the only one who has made a success of rural credit is the much-maligned village moneylender, and even he is usually in other businesses as well.

The following are some of the reasons why small-farm credit is a commercial loser: (1) *High administrative costs*. The work involved in appraising, supervising, recording, and recovering a small loan is not much less than doing so for a larger one, so the small loan cost is very much higher in proportion to loan values. (2) High risk. Small farmers are bad risks. They are unused to handling money, do not keep accounts, are under social and family pressures to mix up the farm money with their own, and are prone to crop failures. They have few resources to cushion them and little to offer as collateral security. (3) Lack of equity involvement. With single-purpose credit, the borrowers have little or no equity stake in the lending institution, and therefore no sense of personal responsibility. In single-purpose credit cooperatives and similar institutions, loans are approved by committees who have no financial stake in what they are doing. (4) Low interest rates. Because of political or moral pressure, interest rates are usually below lending cost.

It is hardly surprising that large numbers of single-purpose credit societies have failed. It is significant that even in Botswana, where consumers and marketing cooperatives have been conspicuously successful, the experiment in single-purpose agricultural credit societies was a failure. The single-purpose credit society, and its variants, are consequences of two errors: (1) that cooperatives should be instruments of government policy, and not businesses in their own right; (2) that the simplest form of organization is the best to run. In business, diversification (up to the limits of management capacity) produces strength: it spreads the costs and it spreads the risk.

Savings and Credit Cooperatives (Credit Unions)

Nowadays, the best known savings-cum-credit cooperatives are the credit unions. Unlike single-purpose credit societies, they are firmly based on regular savings contributions by the members. The collectively-owned savings then constitute a fund from which the members can borrow. The security for loans is the savings of the borrower himself plus those of up to two other members whom he can persuade to act as guarantors. Under this system, the credit union is fully covered. Credit unions also use more conventional forms of security including collateral. Interest on loans is traditionally one percent per month, a rate which, at least until the recent inflation, was more than adequate to make the union profitable. When a profit is made, it is handled in accordance with cooperative principles.

There has been considerable success in establishing credit unions in Latin America and the Caribbean, where they are the most conspicuously successful of all cooperatives. They have, more recently, been introduced into Africa and there is evidence, for example in Cameroon and Lesotho, that they can be made to work. It would be a mistake to claim too much for credit unions; they do have their limitations, and there have been failures. Nevertheless, they do make much better commercial sense than the single-purpose credit societies, and, in the countries where they have become established, are found among the best examples of non-state enterprise by the not-so-well-off section of the population. While they have received some aid, it has been much less than that for many other less successful organizations. It is significant that they are reasonably well managed without excessive government supervision.

The real debate about credit unions is not whether they work or not, but whether they are suitable for agricultural credit. The largest and most successful credit unions have been urban, or among rural salary and wage earners. The system of periodic savings works best among regular wage earners, especially where arrangements can be made for savings deposits and loan repayments to be deducted from the payroll. Small farmers do not receive a frequent or regular income, and the organization of regular savings or loan repayments is much more difficult. Nevertheless, there is some evidence that credit unions can be made to work outside plantations in rural areas; the core membership may well be school teachers, civil servants and the like, but the small farmers are brought in. There are difficulties, too, in making loans for agricultural purposes, since agricultural credit is risky. Committees approving loans know that their own personal money is at risk. This very self-sufficiency, which is the basis for their success, makes credit unions difficult to use as instruments for government credit policies. If a credit union accepts a large external loan, its self-reliance is undermined.

Multipurpose Cooperatives

A multipurpose cooperative provides two or more different classes of service to its members. There are many possible combinations, but the most relevant for this discussion is the cooperative for credit, input supply, and marketing. The member is supplied with fertilizer and other inputs on credit before planting; after the harvest he delivers his crop to the cooperative, which deducts the loan from the proceeds before paying him the balance. In the better organized, such as the coffee cooperatives in Kenya, there is also a savings deposit system, so that the member's passbook account is active throughout the year.

Some have argued that the borrower's crop is useful as security only if there is compulsory one-channel marketing. This view is too extreme. The multipurpose cooperatives in Gambia do not have sole purchasing rights over the crop, for example, but do have a consistently high record of loan recovery. On the other hand, even when there is a single-channel marketing requirement there are still means of evasion for the borrower who is really determined to default. The multipurpose system is, on the whole, less insecure than most others, and ought to be persevered with. There is evidence, too, that education can help: members can learn that it is not in their long-term interests to dodge repayment.

While the security argument is the one most quoted for the multipurpose system, it should also be recognized that a diversity of operations makes for a much more viable business. The costs of management are spread over a wider range of activities. A full-time bookkeeper can be afforded. There is a much more consistent cash flow. If credit is seen, as it should be, as a part of the whole business enterprise, some of the risk can be absorbed as operating costs on the supply and marketing business. If multi-purpose cooperatives give credit, they should do so as part of a profit-making business and calculate the risk as a business cost.

Security and Loan Discipline

It is frequently the practice for governments to enforce some kind of collective responsibility for loan repayment by not allowing a cooperative society to have a new loan until it has paid a stipulated proportion of its previous debts. While some kind of discipline is necessary, this method has the disadvantage of punishing the good individual payers along with the bad. Overdue debt may be perfectly respectable, provided the cooperative has built up the reserves to carry it and the occurrence is temporary. Persistent arrears, however, is evidence of commercial failure, and such cooperatives are not worth further credit.

Other types of security are land, chattel mortgages, and penal sanctions. Land is normally used as security for long-term loans; with default, the lending institution may become the proprietor of land which it cannot sell, or there may be great political difficulties in taking possession. Chattel mortgages could be used for farmers when the loan is paying for something durable, such as a cow or a piece of agricultural machinery. Penal sanctions are not so much a form of security in themselves as a reinforcement of other forms.

While on paper there are various potentially effective systems of security, there is in fact a widespread reluctance to enforce them. Under Indian cooperative law, a society can render a debt to the registrar of cooperatives as a dispute, and can get an award which has the force of a court judgment. The legal framework really is quite comprehensive. The failure to make use of it can only be explained by the fact that the money on loan does not usually belong to the society itself but has come from the government or a government institution, so that the committees and managers do not feel either their own risk or a sense of responsibility. When a cooperative is run as a proper business, it has a normal business's motivation to collect its debts and improve its cash flow.

Rate of Interest

The "Rochdale" cooperative principle of trading at current market prices and distributing any resultant profit or surplus as a patronage bonus has hardly ever been applied to agricultural credit. If it had been, the original agricultural credit societies would have charged the same rate as the moneylender, and (presumably) made a large profit which would have been refunded after the end of the financial year. This would produce a genuine net going interest rate. It was impossible to do this in most countries because right from the beginning a "low" rate of interest was part and parcel of the whole government scheme. Since the farmer's alternative was to borrow from the moneylender anyway, and borrowers had to go back to him when their cooperative collapsed, the argument against market rates of interest had no ethical basis; but this is not the prevailing view. With short-term credit, the amount of interest is trivial, even if the annual rate is high; if the farmer cannot pay the interest, he cannot pay the principal either.

Artificially low rates of interest have been forced on the cooperatives and other credit institutions for political and pseudoethical reasons, and have pauperized entire credit systems, with only trivial and transient advantages to the borrowers. The whole credit system becomes static, and dependent on everlasting financial replenishments from government and international aid. The source of payment for credit should be the additional production which it ought to produce; if a loan does not result in gains to the borrower more than enough to repay it, plus the going rate of interest, it should not have been granted in the first place. Artificially low rates of interest are not only responsible for operational losses in the lending institutions, they are also the cause of corruption and misuse of loan funds. The richer and socially more powerful members of the community have an incentive to borrow because it is cheaper to do so than use their own funds or go through ordinary commercial channels, and they use their power to manipulate the credit allocation in their own favor.

Conclusion

It is not the business of this paper to examine the credit performance of noncooperative institutions, but a glance at their record will show that, in the same type of credit, it is no better. The truth must, surely, be obvious that unsupported low-cost agricultural credit is unsound business in itself. It mixes the commercial concept of credit with charity and welfare. If governments feel that it really is necessary for political, social, or macroeconomic reasons, they must be prepared to subsidize it *ad infinitum*. The best hope of establishing dynamic and self-supporting credit systems in rural areas is through commercially viable organizations such as credit unions, multipurpose cooperatives, and private enterprise.

[Edited extracts from *Borrowers & Lenders*, edited by John Howell, pp. 179-198. Copyright©, Overseas Development Institute, London, England, 1980.]

Success with Group Lending in Malawi

Walter Schaefer-Kehnert

[The Lilongwe Land Development Program initiated a method of lending to small groups of farmers that has been highly successful, especially in repayment. Farmers' clubs formed to assist extension work have also dealt successfully with small-farmer group credit.]

The high cost of lending to individual small farmers is a major concern in rural development programs. In Japan and parts of Western Europe prior to their industrialization, with agrarian structures made up predominantly of small farms, this problem was solved through the formation of cooperatives. In addition to credit, these organizations provided farm input supplies and product marketing services at lower costs than those charged by private trade. Efforts to introduce such multipurpose cooperatives in developing countries have failed (with outstanding exceptions in South Korea and Taiwan), and attempts are being made to find simpler and more manageable "precooperative" structures that provide at least part of the services of the classical farmers' cooperative. One type of precooperative organization is that for group credit, which has been introduced in a number of countries in recent years but with limited benefits. The case of Malawi provides one of the few successful examples.

Shortly after independence, Malawi failed in its initial attempt to promote rural cooperatives. Because of this experience, integrated rural development projects made no use of farmers' cooperatives in their early operations, and it was not until 1973 that group credit was introduced in the pioneer Lilongwe Land Development Program (LLDP), with the objective of reducing the costs of lending.

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Farmers' cooperatives typically have several hundred members, whose dues can pay for a full-time secretary. Credit groups in Malawi, however, have only 10 to 30 members each and rely on unpaid management, which keeps lending costs low. The administrative staff usually consists of a chairman who provides the leadership, a treasurer who ensures trustworthiness, and a secretary who maintains the records of the group. There are more than enough volunteers to fill those positions, because the farmers are not fully employed on their small holdings, and the posts provide social prestige.

In group lending operations the security for credit repayment is usually provided by the joint liability of group members. If a default occurs on obligations to the lender, credit to the whole group is stopped until the default is corrected (and legal action against an individual member may also be taken). This may cause the entire group to be deprived of farm inputs such as improved seeds and fertilizers for the next growing season, which would result in a drop in production. To avoid such losses, the Malawi group credit scheme introduced a "security fund."

Borrowing farmers pay 10 percent of the loan amount as a deposit into a common fund that is kept in trust by the credit institution for the group. If there is a default, the shortfall is made up by drawing on the security fund. Farmers are then free to apply for new credit as soon as the fund is replenished. The group can also evict the defaulting members. Originally, 20 percent of a group's credit was to be deposited into a security fund, but Malawi experience indicated that a 10 percent deposit was sufficient to cover the risk.

A gradual accumulation of deposits over a period of years was originally planned, so that an insurance fund against crop failure could be initated. The LLDP administration did not pursue this idea, however, because most farmers preferred to disband their groups after each season and establish new ones before the next season, so that the membership could be kept flexible. The flexibility was advantageous because as the number of credit groups quickly expanded, the membership of individual groups became increasingly concentrated in smaller locations. Village groups, and eventually extended families, chose to form credit groups. This structure guarantees a higher degree of loyalty from the members of a group because it avoids the anonymity from which cooperative societies with a wider membership usually suffer.

Prior to the formation of the credit groups, another precooperative structure had been promoted by Malawi's marketing agency, ADMARC. This organization encouraged the formation of input supply groups through which farmers could order their fertilizer by the truckload. Members of these groups received a discount on the price of fertilizer and could have it delivered to the location of their choice. This scheme had been highly successful and encouraged LLDP to embark on the group credit scheme.

In areas outside the main projects, the government extension service initiated a drive to form farmers' "clubs" for the purpose of group extension. These clubs established demonstration plots, and club members helped each other introduce modern technologies. In some cases members also undertook communal projects, such as village firewood plantations. Gradually the services of these clubs expanded to include group input supplies and group credit, so that now they are almost equivalent to multipurpose cooperatives. In 1980, there were approximately two hundred farmers' clubs, each with a membership of close to a hundred. Although the membership per club is larger than that of a credit group, only twenty or so members of a farmers' club actually take out loans in a season.

Group Credit Development and Performance

Group credit was first tried in the Lilongwe project, and then spread into farmers' clubs outside the project areas. Statistics on the operations in other areas are not available however. As of 1981, the government of Malawi has decided to extend group lending eventually to the whole country.

Table 1 shows the number of individual and group borrowers in the LLDP area from 1972/73 through 1978/79. Also shown are the number of credit groups and the average number of borrowers per group over this period. (The LLDP administration expected the number of credit groups to reach 2,000 in 1978/79, but the number actually fell short of the 1977/78 figure because the fertilizer being financed did not arrive on time in sufficient quantities.) There are now more group borrowers than individual borrowers, and it is expected that group borrowing will continue to increase rapidly. The government is even considering allowing only group credit in new development areas.

TABLE 1. LLDP INDIVIDUAL AND GROUP BORROWERS

	Borrowers in Thousands			Number of	Borrowers Per
Year	Total	Individual	Group	Groups	Group
1972/73	21.1	21.1	--	--	--
1973/74	25.7	23.9	1.8	94	19
1974/75	25.1	20.5	4.6	242	19
1975/76	32.2	24.6	7.6	410	19
1976/77	36.8	23.5	13.3	670	20
1977/78	42.5	14.6	27.9	1,267	22
1978/79	51.5	23.1	28.4	1,217	23

Table 2 shows the loan amounts borrowed under the LLDP by individuals and farmer groups, the average loan per borrower, and repayment records. The total amount loaned has almost quadrupled over six years, and group credit climbed from zero to more than 50 percent of the loan portfolio.

The average amount borrowed per farmer is around MK30 (Malawi Kwacha 30 = US$40) and does not vary significantly between individual and group farmers.

TABLE 2. LLDP INDIVIDUAL AND GROUP LOANS

Year	Amount of Loans			Loan Per Borrower		Repayment	
	Total	Individual	Group	Individual	Group	Individual	Group
	MK'000			MK		%	
1972/73	382	382	--	18	--	97	--
1973/74	481	460	21	19	12	98	100
1974/75	737	601	136	29	30	98	100
1975/76	859	624	235	25	31	96	99
1976/77	1,012	627	385	27	29	100	100
1977/78	1,292	453	839	31	30	100	100
1978/79	1,461	656	805	28	28	n.a.	n.a.

The repayment record for group credit--100 percent repayment in four out of five years--is most impressive. Repayment by individual creditors used to be at 96-98 percent, but this figure also rose to 100 percent in 1977/78 and 1978/79.

Outstanding Issues

The LLDP administration differentiated between individual and group credit by charging individuals 15 percent and groups 10 percent interest. There is no information available on what the actual cost difference is in administering the two types of credit. The project administration gives credit groups specialized training in self-accounting, so that eventually considerable costs are saved. If farmers have a free choice either to take individual credit or to join a credit group, the difference in lending costs should be reflected in the credit terms--assuming that there is no special reason to subsidize one form over the other. Therefore, plans are underway to investigate the cost difference between individual and group credit.

There appears to be no significant difference in the repayment records of individuals versus credit groups (Table 2). However, there are indications that the almost equal repayment record is achieved with much greater effort in collecting payments from individual farmers than from credit groups. This factor should be included in the cost comparison.

The security fund mechanism used in the Lilongwe group credit scheme is not utilized by the farmers' clubs because the clubs have other funds derived from members' dues and communal operations. These funds, however, are rather small and unlikely to give the same protection as the 10 percent security fund. From the point of view of simplifying credit administration, it would be desirable to apply the same credit mechanism in both the farmers' clubs and the credit groups.

There is no doubt that the farmers' clubs, with their greater continuity and the combination of group extension with group credit, are a higher form of precooperative organization. A distinguishing feature of farmers' clubs, for example, is that members not taking up credit still continue to participate in group extension. On the other hand, farmers' clubs are more difficult to organize than the single-purpose credit groups. Therefore, it might be practical to introduce a kind of graduation process under which credit groups may be promoted to farmers' clubs, and eventually to regular cooperatives.

In meetings held with several hundred members of credit groups and farmers' clubs, almost all expressed the desire to broaden the range of items that would be eligible for credit financing. Among the short-term inputs the demand was strongest for credit in cash to pay casual labor during the growing season. Most farmers' clubs also wanted to receive medium-term credit for farming implements and in particular for bullocks and dairy cows. These items are presently financed only with individual credit, and on a very limited scale because most farmers cannot offer acceptable collateral. The clubs feel prepared to guarantee the repayment of these loans.

One of the clubs has started making loans from its own funds on a limited scale. When asked whether the club would consider accepting savings deposits in order to further build up its funds and provide an additional service, the club members appeared receptive to the idea but were reluctant to make a firm commitment at first, as they were aware of the additional responsibilities that would be accepted. Members showed a definite interest, however, in making savings deposits. This idea appeared especially attractive when discussing the possible interest rates available if interest on deposits were determined by the lending rate minus the very low administrative costs of the clubs. As of late 1981, savings deposits had accumulated to a level that enabled one club to extend 86 loans based on deposited funds.

Conclusions

This experience with group lending in Malawi has proven that precooperative institutions can be developed successfully in poor peasant societies, even in environments where efforts to develop conventional cooperatives have failed. Group lending in Malawi can be distinguished from conventional lending approaches by the following factors:

--The credit groups offer clearly defined economic incentives such as lower interest rates, price discounts on inputs, and relief from individual loan processing.

--The formation of groups is left to the initiative of the farmers; government assists but does not interfere.

--Formation and disbanding of groups is simple and nonbureaucratic.

--Membership in the groups is kept small.

--Management is provided by elected group members who perform their duties without pay, principally for social prestige.

--Operation is limited and simple.

--Members are fully liable for an individual default.

--Group security against default is provided by an advance deposit which is refunded with interest at full repayment of the loan.

It is interesting to note that these features coincide with the principles of Raiffeisen who founded the German cooperative movement more than a hundred years ago. When organizing the first primary societies among peasant farmers his principles were: limited and simple sphere of operations; unlimited liability of members; management by unpaid volunteers. Using these principles, the Raiffeisen societies established a reputation of credit-worthiness that enabled them to borrow from commercial lenders; only later did they broaden their sphere of operation to include input and output marketing, processing, and other services. Today they still handle more than 60 percent of all agricultural trade in the Federal Republic of Germany.

Thus, the group credit scheme in Malawi started with a concept that has a history of success. In line with historical experience, this precooperative concept should not be considered an end in itself, but rather the preliminary stage of an institutional development that can expand and broaden into a genuine cooperative movement. Malawi's experience with a previous cooperative movement that failed--apparently while trying to accomplish too much in too short a time with too much political interference--should guide further development so that the same mistakes are not made again. It may be wise to use a graduated process, the final stage of which could result either in a savings and loan association or a multipurpose service cooperative.

[Edited extract from Quarterly Journal of International Agriculture (Zeitschrift fur Auslandische Landwirtschaft, Berlin), Vol. 19, No. 4, October-December, 1980.]

Money and Commodities: Their Interaction in a Rural Indian Setting

Barbara Harriss

[This article examines a rural area in south India where the money market consists of private traders who compete actively for farmers' purchases or sales by offering them loans on favorable terms, of pawnbrokers, and of state cooperatives offering subsidized credit. State banks are actively lending to the traders so that they may relend to farmers; this results partly from government's effort to increase the use of fertilizers. One consequence of active competition among lenders is to keep many small farmers in operation who might not have survived without such access to credit.]

This analysis addresses itself to the complex nature of a rural money market in south India. Data are drawn from field research in 1973-74 on a random sample of 200 traders in agricultural commodities (rice), agricultural inputs (fertilizer and pesticides) and agricultural investment goods (pumps and irrigation accessories), and from random surveys of twenty village cooperatives and of two hundred paddy producers in twelve villages of North Arcot District of Tamil Nadu State. I examine the private rural money market; the money markets organized indirectly and directly by the State; the linkages between private and public finance, and between the money market generally and the market for agricultural commodities.

The Private Rural Money Market

Evidence from agricultural traders.

The unorganized money market is highly complex. There may be as many as 180,000 farmers in the rice producing eastern region of North Arcot who market paddy (unmilled rice)

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to some 2,300 traders. Traders said they lend in cash or kind to about half their customers. High and increasing demand for production and consumption credit enables traders to discriminate among clients. Private sector money is not necessarily a substitute for cooperative loans; it may be a complement: "If a man can't get a government loan, he's likely not to be able to repay my loan."

A farmer's eligibility for short term loans is determined by traders on criteria similar to those used by State-run cooperatives. Traders assess landholding, crop size, capital assets, and past repayment performance. The private money market is more physically accessible than is that of the State. A trader's shop is open from 6:00 a.m. to 10:00 p.m., loans are obtainable with no paperwork, and the request is usually speedily handled. No security has to be given, and borrowers can use the money for any purpose, agricultural or social.

Agricultural loans obtained on the private money market are rarely small. In the paddy and rice trades and in fertilizer dealing, the lower limits averaged Rs. 200. The largest loans to individuals were between Rs. 2,000 and 3,000, about equal to the maximum permitted by the cooperatives. Traders occasionally lent up to Rs. 10,000, but cultivators seeking large sums were usually advised by traders to apply to nationalized banks or "private parties"--the highly elusive, large-scale, full-time money lenders in the back streets of many market towns. Loan ceilings also varied with the size of the trader's business, smaller traders tending to lend to smaller farmers.

The average annual interest rate for loans was remarkably consistent at 13 to 14 percent, which was slightly above the current legal ceiling of 12 percent. The ways in which interest was paid, just as with the principal itself, were quite varied. Normal repayment was in kind after harvest, although loans for pumpsets allowed a longer repayment period. In some collecting centers, no interest was charged to those who supply the trader with more paddy than the repayment of their debt necessitates. In the town of Arcot an interest rate of 12 percent per annum was universal. In Arni and Tiruvannamalai wholesalers subtracted as interest between Rs. 0.5 and 2.0 per 75 kilogram bag of paddy from the market price, which amounts to a rate of 4 to 10 percent per year.

Interest rates climbed if a farmer repaid more than a month after harvest. It seemed that about one-fifth of all loans took longer than agreed to repay. Slow payers were not necessarily the smallest farmers, sometimes being large farmers who had reloaned borrowed money. In cases of late repayment, interest rates varied from 12 percent to 25 percent. The markets where funds were least available had the highest rates on overdue payments. Great social pressure, moral--and occasional physical--intimidation was exerted on slow payers, and traders exchanged information on "bad risks." According to traders, an average of 5 percent of borrowers defaulted completely. Every trader alloted time and resources to attempt to retrieve his money, costs of potential litigation being weighed against the size of the sum to be lost.

Interest rates higher than the legal ceiling were often attributed to a combination of inelastic and rising demand, the costs of borrowing, and the costs and risks of credit administration. It has also been contended that high interest rates have a component of monoply profit. This was obviously not the case in our study area, where competition among lenders was active.

A few traders attracted small savings deposits. The trader used this money in trade; he would reciprocate the farmer's good faith by giving him small quantities of money (Rs. 3 to 5 for a meal, medicine, or a bus fare) in lieu of interest payment.

Credit and moneylending do not appear to be the basis of an exploitive relationship between trader and farmer in North Arcot, partly because two main castes comprise both cultivators and traders. There are strong ties of kinship as well as money between town and country.

Pawnbrokers contributed to the private rural money market in competition with the nationalized banks, which also lent on pledged jewels. Compared to the banks, pawnbrokers offered greater ease of access, speedier service, easier valuation procedures, and larger loans in proportion to the value of the jewel. Pawnbrokers also charged higher interest rates, allowed thumb impressions, lent on jewels as well as on gold, and lent to any owners of jewelry without restricting loans to those with bank accounts as the banks do. Pawnbrokers were becoming an important source of cash for agricultural production, and the years since 1968 saw a massive increase in their number throughout North Arcot. Interest was higher than that charged by banks and traders, varying from 18 to 25 percent inversely with the size of loan.

It seems that this recent increase in demand largely came from poorer farmers seeking loans of Rs. 50 to 100 to pay agricultural labor, bullock hire, fertilizer, or pumpset repair; and to a lesser extent larger loans for well-deepening and for purposes such as weddings and gambling. Traders would not lend these sums. Demand is highly seasonal (January to May) so that money may be idle at other times; which is partially reflected in the interest rate. Although pawnbrokers are held in low regard by other lenders, they are a more accepted part of rural society than is the formal-sector lending institution.

The evidence we have builds a picture of a relatively competitive money market. On one occasion, because of high default rates and because of fears of State take-over of the grain trade, the Arni Paddy and Rice

Dealers Association of the largest traders decided to act collusively and reduce moneylending to farmers. It was the only association in the District to take such action, and by no means all traders complied. Flows of money from the local marketplace declined over 1973-74. Some traders, anticipating drought, used their spare funds to stock paddy to the legal limit and above. At the same time, credit from fertilizer dealers also dropped in volume, firstly because fertilizer had entered a phase of short supply and promotional credit was unnecessary, and secondly because overdraft facilities for traders did not increase when the price of fertilizer they sold more than doubled.

There was a marked result on the money market. Whereas in 1965 there were 10 pawnbrokers, in 1973 there were 72, and by 1974 there were 88. Within the pawnbroking trade, demand for money for agricultural purposes trebled in 1972-74, encouraging not merely a new intake of pawnbrokers but the emergence of minor government officials, teachers, and clerks as moneylenders, charging 18 to 25 percent. However, it is important to note that while the interest rates charged were illegally high, they were rarely equal to the net rate of return on capital from agricultural commerce, which averaged an estimated 24 percent. The money market is thus structurally flexible. Private intermediaries--traders, pawnbrokers, and jewelers--compete for the business of different types of cultivators, while traders' money substitutes for state loans for smaller farmers.

Evidence from Agricultural Producers. A survey of 200 paddy producers analyzed by B. N. Chinnappa and anthropological research by John Harriss lend support to the description above. Chinnappa's data, on borrowing and farm size, show that the proportion of farmers borrowing for cultivation expenses was very low among the bottom 14 percent cultivating less than one acre (0.4 ha.), while about half of all other farmer groups borrow. In the group taking loans, borrowed money contributed just under half of cultivation costs. Private credit sources, including village moneylenders and pawnbrokers who charge interest, chit funds with disguised interest charges, and friends and relatives who may or may not charge interest, grew less important than banks with increasing farm size.

We have noted that traders did not lend amounts below about Rs. 100, and that pawnbroking was becoming important at the poor end of the spectrum. Since the average loan was about Rs. 180 per acre, it is possible that small farmers were involved in borrowing from traders rather than village moneylenders. Consumption loans may be obtained from traders, and it is possible, judging from the increase in numbers of both agricultural traders and pawnbrokers, that moneylending is being increasingly concentrated in the towns. Certainly the moneylender is not so prominent in the villages, nor are interest rates so high, as in conventional characterizations of other areas of India.

Demand for money in agricultural production has greatly increased for two types of reasons, connected with two rather different forms of production. First, among larger farmers, money is simultaneously lent and borrowed, with interest rates and relative risks juggled in an effort to make a profit. This is known as "rolling," and the English word is used. Second, among small farmers, the demand for cash has increased. This reflects purchase of modern farm inputs including irrigation water, accomodation to increased insecurity, contingencies such as crop failure, the need to replace a team of draft animals or a pumpset coil, and desire for consumption goods.

The Role of State Financial Institutions

Indirect participation in the rural money market. The involvement of national banks in rural money markets began in North Arcot District in 1967, coinciding with the ending of a cooperative monopoly in fertilizer marketing and with the point in the fertilizer cycle when production exceeded demand and marketing agencies instituted vigorous competitive tactics. The financing of agricultural production by the State began in the form of credit sales at no interest to private fertilizer dealers or agents, who repeated the procedure with interest to farmers. A State-owned inputs distribution company was the first to experiment with this, soon followed by the private companies. At the height of this credit boom, a trader's security bore no relation to the loans which were extended, and by 1971 the distributing companies themselves had large debts. Repayment was slow, and many traders went out of business.

By 1973, however, credit competition had stabilized somewhat, largely due to the skillful intervention of the state through the big commercial banks which had been nationalized in 1969. An example of the terms of their involvement is seen in credit purchases by dealers in agro-inputs up to 80 percent of the value on goods bought for purposes of resale, up to a specified absolute ceiling. A dealer was also eligible for an equal quantity of 180-day crop production credit, both for his own crops and for those of farmers, with repayment after harvest. Dealers were required to deposit 20 percent of their sanctioned limit with the banks. They also had to offer their title deeds, hypothecated stocks, or promissory notes, and to pay interest at 10½ percent. Dealers were strictly supervised, having to supply a monthly stock statement and submit to periodic inspection of accounts by bank agents and of stocks of fertilizer by representatives of the distributing companies. Dealers no longer had any privacy in their financial transactions with companies and banks.

In this situation of glut and severe competition, the balance of power shifted to the nationalized banks. The private distributing companies competed with each other for sales (and with the cooperatives as well), while the banks operated virtually identical schemes through every company. Interest rates charged to farmers were unsubsidized and higher than for cooperative credit. This form of finance has been standard practice since 1972 in North Arcot District where private traders sell half of the fertilizer used. All licensed dealers were compulsorily involved, and up to 80 percent of the value of trade could be financed in this way.

The direct role of the nationalized banks. Private moneylending faces formidable competition by the state. The purely private moneylending activities of inputs dealers are swamped by credit extended by the nationalized banks through them. The banks also offer 18-day production credit directly to farmers with over two acres, at the rate of Rs. 250 per acre up to a ceiling of Rs. 1,000 to 2,500 depending on the bank. These standard loan limits were lower and the interest rates were higher than those of the Panchayat Union and cooperatives which also lend to farmers. The farmer had to prove ownership and show all production receipts. A bank manager explained that it was of course very large farmers who knew about this source of finance and used it, often for relending. They were often tardy in repayment, since these delays were not penalized by a rise in interest, and default was a major problem.

The role of cooperative credit. The major competitor with private trade remains the cooperative credit system financed by the Cooperative Bank, which is subsidized. As Chinnappa shows, the 47 percent of the 200 sampled cultivators in North Arcot who took loans got, on average, 32 percent of their production credit from cooperatives. Cooperative credit was disproportionately concentrated on larger farmers. In the sample, the share of cooperative loans in all production credit rose with farm size from 10 percent to 62 percent. A case study of an agricultural cooperative showed that, in the geographical area covered by the village cooperative, loans per person per season averaged Rs. 800 for cultivators with under 3 acres, while for those possessing more than 3 acres they averaged Rs. 2,300--above the official ceiling. Interest rates varied between 8.7 and 9.7 percent per year on postharvest payments, rising to 12.6 percent (the legal ceiling) for overdue payments.

Cooperative loan statistics for all village societies were obtained from the Central Cooperative Bank, Vellore. To a remarkable degree, cooperative credit operated where private credit was least abundant. In the District as a whole, cooperative credit amounted to just under half the quantity supplied by private trade, excluding pawnbroker loans for production. In spite of the State sector's advantages in low rates, other factors reduced its competitiveness: for example, the low interest rate charged was offset by other costs to borrowers. These included inefficient administration, lengthy application procedures, untimely arrival of credit, inflexibility of repayment procedures, and necessity for proof of collateral as well as the cost of bribes. All this raised the effective cost of loans about to the level of those from private traders. Also, the ceiling of Rs. 2,000 on cooperative production loans forced the relatively few cultivators with land holdings in excess of 10 acres to seek extra funds elsewhere if needed. The outright default rate on production loans of 20 cooperative societies surveyed in the study area was 26 percent, rendering the defaulters ineligible for further production loans. Many of them were large farmers. During the election campaign in 1972, farmers were "promised" that a vote cast in the right direction would write off a loss.

The role of state lending to commodity traders. The state encourages the nationalized banks to lend to fertilizer dealers, but discourages loans to paddy and rice traders. However, this was unimplementable, and the financing of intraseason paddy and rice stocks is a secure and profitable form of investment for a bank. So wholesalers and millers may obtain bank loans if they wish. One much publicized case concerned a bank which lent large sums to pawnbrokers and to professional moneylenders in one of the towns in the District. Once this was discovered it was quashed, but there is no doubt that other such activities continue.

The result of such intersectoral linkages and competition is that the existence of cheap state credit increases the availability of money for agricultural production, and exerts a restraining influence on private sector interest rates. This social benefit cannot be quantified but ought to be borne in mind when assessing the social effects of the cooperative subsidy that mainly benefits large farmers.

The Results and Contradictions of Linked Finance and Commodity Markets

This complex money market and the limited expansion of agricultural production that it supports have enabled large numbers of small traders to maintain themselves in business, and to compete with each other and the big traders. One form which this competition takes is lending money to farmers at rather low interest rates. Thus the small trader allows the small farmer to reproduce himself and survive. Why are there so many small traders?

There seem to be at least six reasons why agricultural commerce is relatively crowded: (1) Commerce remains more profitable on the average than any other sector of this region's economy and continues to attract entrants. New entrants to trade come increasingly from the wage labor force of the commercial sector itself, as well as from producers of the commodities sold. (2) Commerce may also be crowded because of demographic expansion. Traders' families are slightly larger than those of the average peasant producer, and family members need employment. Joint family businesses become managerially unwieldy and often split to provide each son with control over resources and sources of funds for consumption and reinvestment. (3) Joint family enterprises also split because tax legislation discriminates against multiple enterprises and joint family combines. There are powerful fiscal incentives for simple single-owner businesses, and many traders acknowledged having split firms for that reason. (4) The personal knowledge of clients necessary in moneylending also may set a limit to the number of clients any mercantile firm can scrutinize and maintain. (5) The state encourages easy entry into commerce in other ways. In North Arcot District the dominant form of intervention attempts to encourage competition through market regulation in an effort to reduce distributors' margins at minimum cost to public funds by trying to maximize numbers in trade. And (6) the central Government's priority for expanding the fertilizer industry to increase food production has led to a spawning of small inputs dealers with only limited scope for concentrating their capital. The international companies distributing fertilizer and pesticides compete through several separate networks of private dealers, through the cooperatives, and even through the State's Department of Agriculture.

The expansion of commerce in inputs itself increases the marketed surplus, which feeds back into commerce again. Competition among traders for farm commodities also takes the form of money lending at relatively low interest rates; in this market the effect on interest rates of subsidized cooperative credit from State-supported institutions has not been negligible. All this helps small and marginal farms to remain in operation and to expand production within limited spheres. At the same time, investment in trade is relatively attractive because of commodity price levels and the opportunity to profit from market imperfections, which are often the perverse result of state intervention. The structure which is involved in this circle--small farmers, a large number of traders, relatively cheap loans from competition in trade credit, and state intervention--reinforces itself and arguably constrains agricultural production over the long run. The tight link between the money market and the imperfectly functioning commodity market allows high return from joint operations in both markets, as trader and lender.

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The Political Economy of Agricultural Credit: The Case of Bolivia

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[Although agricultural credit programs are viewed as fundamentally economically oriented, they are very susceptible, indeed alluring, to LDC governments for political reasons. An example of credit as a political instrument in Bolivia is described. In such cases resources are allocated to satisfy political objectives, with less than optimum results for long-term development.]

There are five major reasons why the political economy of agricultural credit has become important. First, governments typically control the supply of formal agricultural credit, and they can strongly influence its distribution and allocation. Second, concessionary interest rate policy, which is almost ubiquitous in LDC agricultural credit programs, provides an attractive income transfer to borrowers. Third, when governments tolerate long-term delinquency default, as is not uncommon in LDCs, the non-repaying borrower receives a default income transfer. Fourth, when inflation is present, concessionary and income transfers are magnified. Fifth, the advantages of obtaining these transfers are sufficiently attractive that they can be used by governments to gain the favor of borrowers and, conversely, by borrowers to influence government.

Credit programs are particularly alluring for political purposes. First, they are easy to establish and administer. Second, they are very legitimate for economic objectives. Third, because monies are fungible and because of the hidden transfers, the true uses of such funds

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are difficult to identify. Thus, credit lends itself to being used for political purposes under the guise of economic development.

The extent to which credit allocation decisions are influenced by political factors, or vice versa, is difficult to ascertain in practice. The Bolivian case is particularly useful to study. This country is an archetype of underdevelopment and, as one of the world's poorest nations, has been a recipient of large infusions of foreign assistance. Moreover, the country is small enough so the flows in financial markets are more easily identified than in larger and more complex countries.

The Political Elements in Farm Credit

Commercial financial institutions in LDCs have shunned lending to agriculture because of the high costs and risks embodied in these loans. Thus, pressures arose to provide alternative sources of financing. The passivity of the agricultural sector suggested a supply-leading financial approach, and government agricultural banks were commonly established. When it became obvious that government institutions could not meet the needs of financing agriculture, means were sought to force the private sector to lend to agriculture. Central bank rediscount mechanisms, loan guarantees and loan portfolio requirements were common policies. Almost without exception all of these agricultural credit programs incorporated a feature transferred from the United States' Farmers Home Administration credit model: the low and concessionary interest rate. Foreign support for these programs is evident, both in the advice and in the capital supplied in volume by donor agencies. Little attention has heretofore been directed, however, at the tremendous political leverage that the concessionary transfer offers.

A framework for the political economy of agricultural credit. Figure 1 presents a countrywide demand curve DD' for credit from agricultural lenders to be used for agricultural purposes when interest rates are equalized throughout the economy. Assume that the prevailing real interest rate is r, and that farmers would want to utilize OC_1 credit. Suppose, however, that the government subsidized agriculture by means of a concessionary interest rate, r', for agricultural loans but left interest rates for non-agricultural loans at the previous levels. Two effects would occur. First, borrowers would increase the quantity of funds demanded for agricultural purposes from C_1 to C_2; and, if non-price rationing were not employed, they would simultaneously receive a subsidy or income transfer (the concessionary transfer) equal to the area designated by the points r'rab.

Second, since money is fungible, credit can be ostensibly borrowed for agricultural purposes but be diverted to non-agricultural activities such as consumption or investment. This gives rise to "agricultural illusion"--a situation where some agricultural loans have the appearance of going to that sector, but in fact are used elsewhere. With the relatively lower interest rates for agricultural loans, it would be expected that borrowers would behave in this manner--especially those with multiple occupations and knowledge of their investment opportunities--and, the demand for credit from agricultural lenders would shift right to DD". Borrowers would want to use OC$_3$ quantity of credit to practice agricultural illusion, and the concessionary transfer now becomes r'rac.

If further concessions were granted, e.g., r", there would be yet further demand shifts to the right, e.g. to OC$_3$ for farm credit. The horizontal distance between OC$_3$ and OC$_4$ would represent the amount of credit demand from agricultural illusion due to the concessionary rate r". The locus of all equilibrium points for the illusion demand curve for agricultural credit when concessionary interest rates are employed at that sector lies along DD". This demonstrates how agricultural illusion increases the concessionary transfer.

Delinquency provides another possibility for an income transfer. A "delinquency transfer" may be temporary when farmers do not repay their loans on time, or permanent when they never repay the loan. In the case of the temporary transfer the farmer gains from improved income or reduced costs resulting from control over cash flow. The permanent transfer is equivalent to the real value of the loan principal plus the real value of interest charges less any real amounts repaid on the loan principal and as interest. In terms of Figure 1, the amount of the permanent delinquency transfer would be the OC$_3$ loan principal plus interest, assuming a concessionary interest rate of r', agricultural illusion, and no repayment (equal to the area of OracC$_3$).

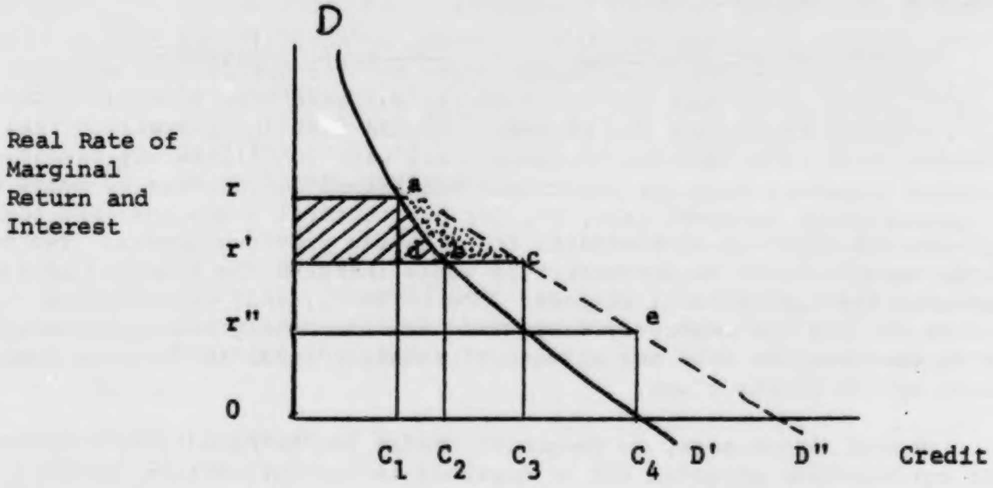

Figure 1. Demand for Credit from Agricultural Lenders.

When inflation is present, a situation common to LDCs, the real rate of interest may be quite low or even negative. The effect is to enlarge the concessionary transfer and the temporary delinquency transfer (because of the lower real value of the loan when repaid). When inflation is anticipated by farmers, the amount borrowed will increase in accordance with the demand schedule and will further enlarge both transfers. The higher the inflation, the greater will be these transfers. In the case of temporary transfers, the longer the delinquency, the greater the transfer.

Clearly the concessionary and delinquency transfers themselves and the additions to these transfers resulting from inflation are to be coveted. Therefore, a government with its control over agricultural credit institutions can use these potential transfers to induce certain types of economic activity and/or to reward certain behavior among borrowers. Moreover, borrowers, in their competition for access to and a share of the transfer, will undoubtedly be willing to bargain with the government. Thus, there is an interplay between government and farmers in which political factors may take on considerable importance.

Heavy delinquency and default rates may be symptomatic of the degree to which political factors have entered into a loan program; when the government does not take legal measures to bring pressure on borrowers to repay, this indicates an unwillingness to bear either the economic or political costs of such action.

The mere existence of these concessionary transfers and the possibility of an easy default transfer create a potential for corruption. Government officials could easily appropriate part of the transfer for themselves by directly or indirectly lending to themselves, or by receiving kick-backs from borrowers.

A concessionary interest rate policy leads to sub-optimal social allocation of credit, of real resources, and of the production of goods. Experience demonstrates that nonprice rationing schemes to offset sub-optimal social allocation are difficult to enforce, and are even more unworkable when political factors intervene. If inflation is present, the additional inflationary transfer enhances the attractiveness of using credit for political objectives and exacerbates the resource allocation consequences.

The concessionary and the delinquency transfers will affect income distribution. Those with access to them will gain at the expense of others. Inflationary conditions will increase the benefits of those who receive these transfers. Concessionary interest rates lead to lower interest revenues for the lending institution if the demand for credit is inelastic and/or the supply of loanable funds is restricted, over the relevant range of the demand schedule. This, in combination with the well recognized high costs of administering agricultural credit programs, will seriously jeopardize a credit institution's financial viability. Further, political lending will lead to erosion of loan funds due to the extensive delinquency inherent in such loans. The result is that to maintain or increase its loanable funds, the institution must be subsidized by government or obtain foreign loans or assistance.

The role of foreign donors. Foreign economic assistance programs contribute to the use of credit as a political instrument in two ways. First, they have provided considerable economic assistance for agricultural credit programs. Second, they have supported the policy of concessionary interest rates that have the effect of creating concessionary transfers. As a consequence they have been an indirect contributor to the use of credit for political purposes, leading to other transfers. This is particularly true for loans that have been made for general agricultural sector development, where credit typically flows to the larger and more sophisticated farmers and agricultural illusion takes on large dimensions. However, even where foreign aid funds are earmarked for small farmers, the additional funds simply increase the size of the lender's portfolio and might permit some substitution for other funds, releasing them for other, often political, purposes.

Can interest rates be raised and defaulting reduced? The obvious economic solution to prevent all these distortions is to raise interest rates and decrease default. Why, then, have policies of higher rates not been put into effect? Furthermore, why don't many lenders use their legal power to limit default? The suggested answer is that the political cost is too great: governments would lose a means of bargaining for political support; farmers would stand to lose their transfers; and where corruption occurs, officials would lose these sources of income.

The Case of Bolivia

The framework is applied to Bolivia during the government of General Hugo Banzer, 1971-1978.

The regional distribution of agricultural credit after 1971 was highly skewed to the tropical lowlands located in the department of Santa Cruz. Between 1973 and 1978, 68 percent of commercial bank loans went to that department. Between 1971 and 1978, 64 percent of the volume but only 23 percent of the number of Bolivian Agricultural Bank (BAB) loans went to Santa Cruz. In contrast, according to the 1976 General Population Census, only 12.6 percent of the rural population lived in that department. Further, for the period 1964-1971, only 43 percent of the BAB credit from regular credit lines had gone to Santa Cruz.

Several interdependent factors explain the highly disproportionate share of agricultural credit going to Santa Cruz in the Banzer period. First, the petroleum and agricultural boom in the region was viewed as the leading edge of the Bolivian economy. Rapid gains in food import substitutes and agricultural exports were expected from its commercial farms, whereas these possibilities were not foreseen for the small-scale traditional farming areas in the highlands. Second, geopolitics was another factor. With the new petroleum development, Bolivia viewed the growth of Santa Cruz as a buffer to further encroachment by Brazil, which had previously taken considerable territory in the rubber boom of 1899.

Whereas both of these factors were important in explaining the disproportionate credit flows, we suggest that domestic political factors were also important in the credit allocation. President Banzer had risen to power in a military coup with the support of a coalition of interest of which a very important element was farmers in Santa Cruz. Hence Banzer was obliged to these persons not only for his sudden rise to power but also for their continued political support.

Institutional and policy structure. Over the 1971-1978 period, 59 percent of bank credit to agriculture in Bolivia came from BAB. In addition, the government-owned State Bank, a commercial bank, loaned approximately another 20 percent. The system was very amenable to government control. Credit was employed as the major agricultural sector policy instrument to "lead" agricultural production by means of a number of special credit programs established by the government and donors of foreign aid. Key features of credit policy were concessionary interest rates and central bank rediscounts to the banking system from special credit lines for agriculture.

Foreign assistance played a major role by providing a steady inflow of funds which freed government funds for lending to some major enterprises such as cotton (little foreign assistance was used for this crop), as well as for liquidity which the institutions needed in view of soaring and heavy delinquency. From 1976 to 1978, there were $146 million (all figures in the paper are reported in current U.S. dollars) in foreign assistance committed for agricultural credit. A conservative estimate is that at least 45 percent of bank credit (BAB and commercial banks) came from this source.

Concentration of credit. Over the 1971-1978 period BAB loaned $80.9 million in Santa Cruz in 3,348 loans. Of this amount, $45.9 million went to cotton in a total of 726 loans. A much smaller amount, $4.1 million, was directed to 118 farmers for soybeans. The average size loan for cotton and soybeans was $63,169 and $34,525 respectively, much larger than the $5,287 national average. Credit for the two crops, which represented 41 percent of the national BAB loan portfolio, only went to a few farmers (6 percent of BAB loans). These loans were made primarily to the larger farmers of Santa Cruz, many of whom belonged to that region's elite and/or to powerful regional interest groups such as ADEPA (The Cotton Growers Association).

Income transfers. The recipients of BAB cotton and soybean loans received total income transfers of at least $44.5 million over the period, an amount only slightly less than the $49.9 million of principal originally loaned. The average transfers for cotton and soybean loans were $55 and $39 thousand respectively per borrower.

Almost $6.2 million of these transfers result from interest rate concessions of 12 to 15 percent for BAB clients relative to the rates charged by commercial banks for commercial loans. Since the commercial rates are maximum rates established by the Central Bank, they are likely to be less than the true opportunity cost of credit. To the extent this holds true, the concessionary transfer is understated.

The effect of inflation is to reduce the real interest rate and therefore to provide an additional transfer to the borrower. With the exception of 1973 and 1974, inflation in Bolivia was mild, yet the income transfer associated with inflation was very substantial, estimated at $8.2 million.

From 1971 to 1978, BAB delinquency worsened. At the end of 1971, 15 percent of the loan portfolio was overdue; at the end of 1978 it was 43 percent overdue after reaching a high of 47 percent in 1977. Had many loans not been refinanced or extended, the figures would have been much higher. The delinquency is concentrated in Santa Cruz; in 1978, 68.8 percent of the total BAB delinquency was in that department. Both cotton and soybeans contributed to the high proportion of loan volume delinquency.

At the end of 1978, the delinquency transfer associated with cotton and soybeans was $30.1 million. Before June 1977, the government would not permit BAB to pressure farmers for repayment; the government issued Supreme Decrees to buy some private banks' delinquent portfolios and transfer them to BAB so that these lenders would not pressure farmers. In June 1977, Banzer issued a Supreme Decree which extended all BAB and State Bank cotton and soybean loans for periods of eight to twelve years. If the loans are paid back as scheduled, the borrowers will pay back virtually nothing in terms of real value due to the depreciating effects of inflation--the equivalent of a permanent income transfer.

The large BAB income transfers for borrowers for the two crops in Santa Cruz cannot be entirely attributed to political factors. Poor client selection, bad weather, insects and marketing are other reasons. But even in cases of the latter, political intervention led to sizeable transfers. For example, in 1973, BAB and commercial banks financed large quantities of cotton and ADEPA made forward contracts to sell cotton on the world market. When the world price exceeded the forward price, ADEPA refused to sell. The government supported them as Banzer established a minimum price by Supreme Decree. The world buyers refused to pay this higher-than-contracted price and much cotton remained unsold while delinquency soared.

The case of BAB is suggestive of what also happened in the State Bank. Unfortunately, inadequate data do not permit a breakdown of transfers for credit from that institution. They are, however, sizeable. This institution also began to lend heavily for cotton and soybeans in Santa Cruz after 1972. By 1977, they had discontinued lending to agriculture because of heavy delinquency. In 1978, they had $22.4 million in 232 past due loans, most of which were for cotton and soybeans. Clearly, income transfers associated with these loans were also very substantial.

Consequences. The effect of credit being used as a political instrument to benefit the Santa Cruz commercial farming elite undoubtedly contributed to political stability during the Banzer reign. However, the elite's access to credit and the associated income transfers gave them a larger share of national income. Their ability to practice agricultural illusion through investment in real estate, commerce and conspicuous consumption further enhanced their income and worsened regional and personal income distribution. For example, the highland peasants gained little, and if it had not been for foreign aid for small farmer credit which began in 1975, it is doubtful that this large mass of farmers would have received much credit at all. It is very plausible that such inequities were important factors in the defeat of the government's candidate in the 1978 elections.

The long-run viability of financial institutions was seriously harmed. After 1976, the State Bank withdrew from agricultural lending because of the high costs associated with its heavy delinquency. In March 1979, BAB had to be rescued from bankruptcy. A $41.5 million government bond issue permitted BAB to meet its financial obligations.

Implications

What lessons does the Bolivian experience provide for the design, or redesign, of credit programs in LDCs? Some ways to reduce political elements in agricultural credit would be to reduce inflation, eliminate the concessionary interest rate policy, and decrease default. The elimination of government agricultural credit institutions would be a stronger move; but that would be going too far, given the historical evidence of commercial banks shunning agricultural loans, especially to small farmers. The elimination of concessionary interest rates would put the cost of agricultural credit on a par with the opportunity cost of money in other uses, so that attractiveness of farm credit as a patronage measure would be diminished. Moreover, by raising the price of credit, it would flow to its more productive employments, and higher interest might stimulate increased savings.

However, there would be considerable difficulty in raising interest rates. The borrowers are accustomed to receiving the concessionary transfer and would resist losing this benefit. For the large farmer, it would mean reducing the opportunity to get cheap money for other uses; for the small farmer, it would be a loss of the preferential treatment he believes is owed to him; from both farmer classes the government would expect resistance. Furthermore, it is doubtful that the government would be inclined to raise the rate, because that would seriously reduce its options in using agricultural credit as political patronage.

The Bolivian case is not unique. It is likely that political forces figure strongly in credit allocation decisions in most nations. While patronage in distribution may contribute to short-run political stability, it is subject to abuse and has undesirable consequences for resource allocation, income distribution and financial institution viability. The degree to which credit can be used as a political instrument would be substantially reduced if concessionary interest rates were eliminated, a tougher stance on default were taken, and inflation were reduced.

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LIVESTOCK

LIVESTOCK ON THE HIGH PLATEAU
OF THE ANDES IN PERU
(PHOTO: INTERNATIONAL LABOR OFFICE)

Potential of Sheep and Goats in Less Developed Countries

C. Devendra

[This paper addresses the current status of sheep and goats in the less developed countries: the value of these animals; their contribution in terms of meat, milk, fiber and skins; their socioeconomic and nutritional status; present levels of production; and their special characteristics in the potential for increasing food production. Particular emphasis is placed on the present constraints on production and on the research thrust necessary to stimulate research and development on both species.]

The maximization of world food supplies, essentially of calories and proteins, assumes a thorough exploitation of all available avenues of food production. Animal proteins are in demand, and increased production is justified by the tendency toward crop cultivation that provides starch-rich, protein-poor diets for the people in the less developed countries (LDCs), especially for low income groups. Animals can forage on land that will not produce crops.

In animal production systems, a particular species may be utilized because of its economic importance, its place in agriculture, or its ability to make use of available feedstuffs. Sheep and goats are the most neglected of farm animals with value for humans in LDCs. While the functional value of these small ruminants as renewable resources for poor people in LDCs is widely recognized, efforts to increase the productivity from them have been meager. The development of technology is hampered by a sparse base of knowledge due to limited research, and a variety of constraints. Limited knowledge about sheep and goats is associated with inadequate understanding of their production systems and incomplete exploitation of

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the species. Increasing sheep and goat production in LDCs, therefore, offers important opportunities for improving the living conditions of the people in these countries.

Most LDCs are located in the tropics and subtropics. The per capita incomes in these countries are low. Usually, the intake of energy and especially proteins is also low, and FAO data (1976) indicate that countries in Africa and South Asia had the lowest animal protein intakes averaging 11.4 and 9.8 g per capita, respectively.

Population of Sheep and Goats

It is significant that the LDCs possess approximately 400 million sheep and 327 million goats, about 40% and 80% of the world totals (see Table 1). The largest proportions of the total world sheep and goat populations, 15.4 and 30.7% respectively, are found in Africa.

TABLE 1. DISTRIBUTION OF SHEEP AND GOATS IN THE LDC BY REGION[a]

	Total sheep population (thousands)	Distribution[b] of sheep, (% of world)	Total goat population (thousands)	Distribution[b] of goats, (% of world)
Africa	159,496	15.4	126,704	30.7
Central America	6,565	.6	13,573	3.3
South America	84,842	8.2	27,145	6.6
Near East	81,045	7.8	47,211	11.5
South Asia	67,928	6.5	112,759	27.3
Total in LDCs	399,876	38.5	327,392	79.3

[a] Source: FAO *Production Yearbook*, 1976.

[b] The total world population of sheep was 1,033.6 million and of goats 403.2 million.

Within each major region, both sheep and goats are widely distributed. Goats are probably more widely distributed than sheep, ranging all the way from the arid and semi-arid areas to the super-humid environments. In India, for instance, goats range from the high altitudes and arid areas of the north to very humid coastal areas of the south. Sheep tend to be more concentrated in the arid regions of the north Indian plains, but goats also flourish and prefer areas of low rainfall - 75 cm or less. Sheep are more important than goats in the highland ecozones and in the semi-arid areas of North Africa, the Near East and Northwest Africa. By contrast, goats are more important in the Indian subcontinent, and a similar situation exists in Nigeria, Haiti, the Dominican Republic, Venezuela, Malaysia and Indonesia. In parts of North Africa, the Sahel and East Africa, on the other hand, sheep and goats are about equally important.

An analysis of population changes between 1961-1965 and 1976 indicates that the increase for goats (14%) in all LDCs was about twice that for sheep (7%); the annual rate of growth for sheep was about 0.5% and that for goats was about 1%.

Functional Importance of Sheep and Goats

Sheep and goats are valued primarily for the production of meat, milk and fiber (wool, hair, mohair and pashmina). In addition, they are valuable for the production of blood (for serum), fertilizer (blood, bone, dung) and horns. They also have value for transport, sport, prestige, employment and rural nutrition and as experimental animals.

According to the United Nations 1976 *Statistical Yearbook*, as many as 10 million full-time, economically active people were dependent on sheep and goats in LDCs, notably in the Near East, Africa and South Asia. These people represented about 3.5, 1.1 and .7% respectively, of the total labor force in the three regions. Gross domestic product (GDP) data suggested that Africa ranked first in value of total production from these animals, followed by the Near East. In the proportional contribution of sheep and goats to national income the near East was highest, followed by Africa, Latin America and South Asia. There is, however, considerable variation among countries in these regions.

Meat Production. Table 2 presents the contribution of sheep and goats to meat production according to the 1976 FAO *Production Yearbook*. Sheep and goats in LDCs contributed about 46 and 72%, respectively, of the total world production of mutton and lamb and goat meat. South Asia produced both the highest percentage of mutton and lamb (20%) and the highest percentage of goat meat (26%). Much of the mutton produced came from Afghanistan and Pakistan, while India contributed most of the total goat meat produced in the region.

The demand for goat meat is high throughout the LDCs, and inadequate supplies to meet the demand result in relatively high prices per unit of meat sold on the market. This situation is particularly evident in several countries in South Asia and the West Indies. With goat meat supplies insufficient to meet the demand, mutton has been sub-

TABLE 2. CONTRIBUTION OF SHEEP AND GOATS TO MEAT PRODUCTION[a]

Region	Total meat production from ruminants[b] m tons, 10^3	Mutton and lamb, m tons, 10^3	Avg carcass yield per sheep,[c] kg	Goat meat, m tons, 10	Avg carcass yield per goat,[c] kg	Mutton and lamb as % of total world production[d]	Goat meat as % of total world production[e]
Africa	18,783	672	14.0	424	10.0	12.2	25.7
Central America	3,373	20	15.4	20	12.3	.4	1.2
South America	4,051	150	14.6	55	12.3	2.7	3.3
Near East	1,308	605	16.4	257	14.3	10.9	15.6
South Asia	2,429	1,099	13.9	432	12.0	19.9	26.3
World	52,889	5,530	15.0	1,644	12.0	–	–

[a] FAO (1976)

[b] Beef and veal + mutton and lamb + goat meat.

[c] Excludes offals and slaughter fats.

[d] Contribution from LDC as percentage of total world mutton and lamb production = 46.0%.

[e] Contribution from LDC as percentage of total world goat meat production = 72.3%.

stituted in some countries where there is a tradition of goat meat consumption. Goat meat is used mainly for home consumption in village and rural areas.

Milk production. Production of goat milk is more important than production of sheep milk in LDCs (Table 3). According to the 1976 FAO Production Yearbook, LDC goats produced about 69% of the world supply of goat milk, while sheep in the LDCs produced 47% of the world's sheep milk. The bulk of the LDC sheep milk was produced in the Near East, notably in Iran and Syria. No sheep milk was produced in Central and South America. Goat's milk was produced in all the regions, with South Asia most important, followed by the Near East and Africa.

TABLE 3. CONTRIBUTION OF SHEEP AND GOATS TO MILK PRODUCTION[a]

Region	Total milk production[b] (1,000 tonnes)	Sheep milk,[c] (1,000 tonnes)	Goat milk,[d] (1,000 tonnes)	Sheep milk as % of total world production	Goat milk as % of total world production
Africa	12,371	532	1,230	7.4	17.6
Central America	6,823	--	246	--	3.5
South America	18,789	--	132	--	1.9
Near East	9,696	2,453	1,286	32.7	18.4
South Asia	15,684	535	1,904	7.1	27.3
World	432,672	7,503	6,975	--	--

[a] FAO (1976).

[b] From cows + buffalo + sheep + goats.

[c] Contribution from LDC as percentage of total world production = 46.9%.

[d] Contribution from LDC as percentage of total world production = 69.8%.

Fiber, skins and hides. South America and the Near East were leaders in greasy wool production. Peru produced most of the greasy wool in South America, and in the Near East Turkey, Iran, Iraq and Syria were important.

Goats in the LDCs contributed importantly to the world supply of skins and hides. Goat skins were produced mainly in South Asia and the Near East, which together accounted for about 72% of total world production. India, Bangladesh, Indonesia and Nepal, and in the Near East Turkey, Iraq, Saudi Arabia, Yemen, Iran and Syria are the leading producers. The bulk of LDC sheep skins was produced in Africa and the Near East--23% of world production. In Africa, the main contributing countries were Sudan, Morocco and Ethiopia; and in the Near East Turkey, Iraq and Iran.

Miscellaneous functions. Apart from their main functions in the production of meat, milk, fiber and skins, sheep and goats are also important in a number of other ways. They are used as investments, as insurance against the failure of crops, for slaughter during festive occasions, for recreation, as a supply of manure for fertilizer and as experimental animals. Both species have also been used occasionally for transportation, especially in mountainous regions such as Nepal, Bhutan and Sikkim. In addition, sheep and goats also supply horns, hooves, blood for serum, blood and bone meal, all of which have commercial value.

Impact on rural health and nutrition. Sheep and goats have a significant impact on rural health and the nutrition of several million people, especially those on the poverty line in the LDC rural areas where they are raised. Particularly for the more vulnerable groups--pregnant and nursing mothers and the young--goats and sheep provide a small but consistent and significant supply of animal proteins of high biological value in the form of meat and milk, plus essential minerals and fat-borne vitamins. These ready sources of meat and milk often make the difference between adequate nutrition and malnutrition for many rural people who cannot afford to buy such products and are unable to produce these products by rearing cattle or buffaloes. The magnitude of this contribution is not easily measured, but it is probably more significant than is realized. The fact remains, however, that throughout LDCs as a whole the average intake of meat and milk from sheep and goats is negligible, and its possibility for increase is, therefore, potentially significant.

Pattern of Ownership

Attempts to increase research and development efforts on goats and sheep will need to take into account the pattern of ownership of these species in LDCs. Such efforts must address themselves to the smallholders or landless agricultural laborers, who represent most of the world's poor, because in many parts of the world the great majority of sheep and goats are owned by poor farmers or herdsmen. Elsewhere large holdings prevail.

According to World Census of Agriculture, 60 and 71% of the sheep and goats in Asia were found on land holdings consisting of less than

5 hectares (Table 4), reflecting also the pressure on the use of land for alternative purposes. In Africa, however, where land is less limiting, 85 and 92% of the goats and sheep, respectively, were found on land holdings of more than 100 hectares. And in South America most of the sheep are found on large-scale ranches with large herds.

TABLE 4.

DISTRIBUTION OF LIVESTOCK BY SIZE OF FARM FOR SOME LDC REGIONS[ab]

Region	No. of countries	Animal population	1 to 5 ha, %	5 to 10 ha, %	10 to 20 ha, %	20 to 100 ha, %	>100 ha, %
Sheep							
Africa	4	45,148,928	4.4	.7	.8	2.1	91.7
Asia	3	31,518,507	60.0	16.0	13.8	8.7	1.3
South America	5	39,534,545	25.0	4.6	7.0	7.0	59.0
Goats							
Africa	3	7,823,319	7.6	1.0	.6	5.3	85.2
Asia	6	29,020,627	71.2	14.3	8.6	5.0	.6
South America	4	6,521,938	64.3	9.3	10.0	10.2	5.9

[a] FAO - Report of the 1960 World Census of Agriculture (1971).

[b] In Africa, most of the large "farms" would be communal rather than individually owned.

In many parts of the world, small herds owned by small farmers are the dominant pattern. In the West Indies, ownership of small flocks of sheep is the rule rather than the exception. In Indonesia, it is common for small flocks of two to 10 head to be owned by peasants. In Fiji, goat raising is entirely in the hands of the Indian settlers, on farms, and the average number of goats carried is three per hectare. Small flocks (one to nine) are also common in Malaysia. In Himachal Pradesh in India, the size of both migratory and stationary flocks of sheep ranged from 11 to 54 and 5 to 51.7, respectively. In Nigeria and the Ivory Coast, the average numbers of goats and sheep per flock, respectively, are 2-3 and 4-5.

Systems of Production

There are four systems of sheep and goat production in the tropics and subtropics: (1) tethering, (2) extensive production, (3) intensive production and (4) integration with cropping systems.

Both tethering and the extensive systems represent traditional village systems typical in Africa, parts of Central America and South Asia. Here, the animals browse and scavenge on what feeds are immediately available near the farm and the house. If animals are tethered, they will be tied so they cannot move very far; with an extensive system, they will be allowed to forage more widely. A tendency to treat sheep and goats with special care and also to feed them with kitchen remnants in Africa, however, encourages the animals to remain closer to the villages than they otherwise would.

Tethering and extensive production are by far the most common systems. A very low level of mostly unpaid family labor represents the main work input. In the extensive system, sheep and goats may graze over large areas, especially on marginal lands with low rainfall which are unsuited for alternative forms of agriculture. This is more evident in Africa than in Asia (Table 4). The system includes nomadic, transhumant (seasonal migration of livestock) and sedentarized patterns of production, and is characterized by the fact that more animals tend to be carried than in the intensive system. Also, few or no feed concentrates, salt or mineral licks are provided.

The intensive system is one in which the animals are fed in confinement with limited access to land, a system with a high labor and cash input. In this system, cultivated grasses and (or) by-products are fed *in situ*. In Jamaica, intensive goat production on Pangola grass with a carrying capacity of 37 to 45 goats per hectare has been demonstrated. An avenue that merits exploitation on an intensive basis is the feeding of agro-industrial by-products such as rice straw with molasses-urea supplementation, since rice straw is abundantly available in monsoon Asia, with yields of about 1.4 tons/hectare. With goats, this system of feeding also has the advantage of allowing control over the animals. Dairy goats are usually stall-fed; in Israel, for example, intensive milk production mainly from Saanen goats is based on this system.

A variation of intensive production based on a stall feeding approach is feedlot fattening. This method appears to have had little application with goats, but it has been used successfully with sheep, in Egypt, for example. These studies suggest that much more use can be made of such systems, especially in environments where agro-industrial by-products are plentiful.

The fourth method, the integration of sheep and goats with crop agriculture, has been practiced to some degree in most countries, but the nature and extent of the integration depend on the type of crops being grown and the relative importance of sheep and goats. For example, in Fiji, 70% of the goat population is found in the sugar cane growing areas. In Sri Lanka, Malaysia, Indonesia and the Philippines, sheep and goats undergraze coconut, oil palm or rubber plantations. The advantages of the system are: increased fertility of the land via the return of dung and urine, control of waste herbage growth, reduced fertilizer wastage, easier management of the crop and possibilities of increases in crop yields and greater economic returns.

The feed cost in each of the production systems is different, and represents an important determinant of the ultimate net economic benefit. In Malaysia, for example, the proportion of total costs attributable to feed for goats grazing uncultivated grass for meat was 2.2%. For goats stall-fed with cultivated grass for meat, feed represented 23% of the total cost. For goats stall-fed on cultivated grass and concentrates for milk, the figure was 48.2%.

Level of Productivity

The present level of productivity of both goats and sheep is generally low, due to a combination of factors including under-feeding, disease and poor husbandry. In Ghana, for example, the birth rate (young born as a percentage of females mated) of a flock of sheep and goats was only 69.4%, among which the annual mortality rate was 20.0%; a parallel situation in other regions of LDCs is not uncommon. Goat size and numbers are determined largely, especially in the extensive and free range system, by fluctuations in the environment, notably the availability of feed.

Low productivity will persist in the extensive regions, such as parts of Africa and the Middle East, until improvements are made in husbandry, management, organized breeding and disease control. There is no doubt that improved husbandry practice is the most effective means of ensuring high productivity from both goats and sheep; without sound husbandry practices, the potential productive capacity of these animals is often not realized.

Of the various environmental factors which limit production from sheep and goats, nutrition is by far the most important. The live weight at slaughter, hot carcass weight, and the weight of meat can be improved by as much as 53.8, 79.3 and 47.1% respectively, as shown in a Malaysian comparison of rural goats with those of the same breed in experiment stations. Equally significant is the fact that the total salable weight, and therefore returns, can be improved by 34.1%. Every effort must therefore be made to ensure that animals are well fed, quantitatively and qualitatively, through application of current concepts of applied nutrition.

Effective Use of Genetic Resources

The low level of production from sheep and goats is also due to poor quality of the genetic resources. Because of neglect, inadequate knowledge of the value and productive capacity of indigenous breeds, and very little purposeful selection and breeding, the performance of both species has been generally poor. However, there are examples of outstanding breeds, e.g., the Chios sheep of Greece and Cyprus, the Barbados Blackbelly sheep of the Caribbean, the Maradi goats of Niger and the Barbari and Black Bengal goats of India.

In view of the importance and possibilities of increasing productivity by genetic upgrading that have been observed when this practice was undertaken, the improved goat breeds that are likely to make the greatest contribution within the tropics and subtropic regions are listed in Table 5.

TABLE 5. SUGGESTED IMPROVER BREEDS OF GOATS[a]

Speciality	Breed	Climate in country of origin
Milk: high yields	Saanen[b]	Temperate, subtropical, wet
	Anglo-Nubian[b]	Temperate, tropical, dry
Milk: medium yields	Jamnapari	Tropical; subtropical dry
	Barbari	Tropical, dry
	Beetal	Tropical, dry
	Maltese	Subtropical, dry
Meat	Barbari	Tropical, dry
	Jamnapari	Tropical, subtropical, dry
	Ma T'ou	Subtropical, humid
	Kambing Katjang	Tropical, humid
	Fijian	Tropical, humid
Prolificacy	Black Bengal	Tropical, dry
	Barbari	Tropical, dry
	Malabar[b]	Tropical, humid
	Ma T'ou	Subtropical, humid
Mohair	Angora	Subtropical, humid
Skin	Black Bengal	Tropical, dry
	Red Sokoto	Tropical, humid

[a] Devendra (1974).

[b] Indicates breed is polled.

Overgrazing

In increasing the use of chosen breeds in well-planned programs for meat, milk, fiber or skin production, one must have control over numbers and match these with land and feed resources. With goats, inadequate control in the past is perhaps the main reason for environmental degradation. It is estimated, for example, that the rangelands of northern Iraq can carry about 250,000 sheep and goats without degradation; currently, however, the population is more than four or five times that large. Similarly, in Rajasthan in India, the area available for grazing dropped from 13 million to 11 million hectares between 1951 and 1961, while the total population of goats, sheep and cattle increased from 9.4 to 14.4 million and is still growing. The practical consequences of this situation are the extension of cropping to marginal land and a reduction in the total grazing area.

Measures of Efficiency

Efficiency of energy and protein conversion. The approximate efficiencies with which goats convert various animal feeds to food for humans are indicated in Table 6. It is emphasized that these efficiencies are approximate values that vary with the rate of production. The efficiencies of milk production in goats are higher than the values of 21, 23 and 10% for energy, protein and energy cost of protein, respectively, reported by Holmes for dairy cattle. The efficiency values for energy conversion in goat meat production are generally similar to values of 5.2 to 7.8% reported by Taylor for beef, and slightly higher than values of 2.4 to 4.2% reported by Spedding and Hoxey. The apparently greater efficiency of goats than of cattle in converting nutrients to milk is an important characteristic of the species.

Biological efficiency. The biological efficiency of an animal is defined as a measure of the ability of the species to reproduce, survive and maintain its numbers in a given environment. With respect to goats, this definition is particularly relevant in light of the species' characteristics: short generation interval, reproductive capacity and the efficiency with which they produce valuable animal products.

Present evidence suggests that goats are more efficient than other species. This apparently high efficiency of goats may not be generalized; it may be specific to certain conditions, or to certain feeds--especially if these are coarse. But it is distinctly possible that goats derive a higher metabolizable energy from their feed than do other species.

TABLE 6. APPROXIMATE EFFICIENCIES OF ENERGY AND PROTEIN CONVERSION IN GOATS[a]

Goats	% efficiency		Energy cost of protein, g/Mcal ME[d]
	Energy[b]	Protein[c]	
Milk production (lactation)	24.0	23.7	14.5
Meat production (fattening)			
On grass	4.7	9.1	5.1
On grass + concentrates	6.7	10.2	7.5

[a] Devendra (1976a).

[b] Energy expressed as kilocalories/100 kcal of metabolizable feed energy consumed.

[c] Proteins are expressed as edible protein per 100 g of feed protein consumed.

[d] Edible protein per megacalories ME.

Disease Status

Disease is one of the main constraints on sheep and goat production in the LDCs. Economic loss due to disease and parasites is probably high, and in sparsely populated areas where the veterinary and diagnostic services are weak, the losses must be considerable. It is perhaps worth stressing that in adults the most severe effects of disease and parasites are manifested in production losses, including problems of fertility. These effects are due to nutritional stress, debilitation and internal parasites. In Nigeria, gastrointestinal helminthiasis (caused by parasitic infestation) is reported to be the most serious disease problem among Udah and Yankasa sheep. It is patently clear that much production loss can be reduced by improved husbandry management. Vigorous research on animal diseases therefore represents another potential means of increasing productivity from both species.

Exploiting the Characteristics of Sheep and Goats

A prerequisite to maximum exploitation of any species in an understanding of those characteristics that are peculiar to the species.

Small size. The small size of sheep and goats as compared to other meat and milk producing animals is significant for a number of reasons:

(1) *Economic:* Low individual sizes mean lower cost and also small initial investment and correspondingly small risk of loss from individual deaths.

(2) *Managerial:* Both species are conveniently cared for by unpaid family labor (women and children), occupy little housing space, and supply both meat and milk in quantities suitable for immediate family consumption. These facts have the important advantage of minimizing the problems of storage.

(3) *Biological:* With minimum land and a low level of nutrition, sheep and particularly goats are more likely to survive than are cattle or buffalo.

Digestive efficiency. Small ruminants have the unique capacity to convert waste vegetation and roughages effectively, especially in the marginal areas, to products that are of value to man.

Reproductive efficiency. The factors that will influence reproductive efficiency are age at first mating, life span of the breeding flock, mortality rate, and lambing or kidding percentage. Goats are superior to sheep in reproductive performance. In Nigeria, for example, comparative reproductive rates are 115% lambing percentage and 150% kidding percentage a year. Similarly, in Sudan, high offtakes in goats compared to sheep are associated with a high birth rate and a high level of survival after the first week of life. Twinning appears to be more common in goats than in sheep. Often, high fertility is coupled with a relatively short generation interval, both of which are important factors in early economic viability of sheep and goat projects.

The Future

The demand for more food from sheep and goats, consistent with their functional importance, implies that if present trends continue the populations of both species are likely to increase. Can the available resources support this growth? Table 7 provides estimates of the demand for sheep and goats in the year 2000 based on the United Nations medium projected population and increased per capita consumption of sheep and goat meat associated with increased disposable income.

TABLE 7. PROJECTED HUMAN, SHEEP AND GOAT WORLD POPULATIONS[a,b,c]

(in millions)

Category	1976	2000[b]	% increase
Human	4,013	6,321	56.3
Sheep	1,038	1,853	78.5
Goats	413	900	117.9

[a] UN population projections, medium variant.

[b] FAO (1976).

[c] Projections for 2000 assume no changes in the present level of productivity and pattern of consumption.

Assuming that the 1976 carcass yield data and current production and consumption patterns (Table 2) do not change, it is estimated that the sheep and goat populations in the year 2000 will be 1,853 and 900 million, respectively. These totals represent increases of about 79 and 118% over the 1976 populations. The increases are enormous, and it is doubtful that they can be supported, especially in relation to the growing human population, given the competition for land and other resources. Increased production per animal unit is thus very important. T. C. Byerly contends that in order to maintain or increase per capita supplies of ruminant meat and milk, the world as a whole will have to increase support for research and development by at least 45% over the next 25 years.

Priorities for Research

In examining productive potential in the context of priorities for research, it is essential to consider three important facets of the program: (1) production system, (2) target ecological zones, and (3) major contributing disciplines. Consideration of these factors allows one to assess the nature of the problem and the different disciplines that are likely to stimulate increased production in any one target area. An attempt is made below to identify types of production systems with major contributing disciplines in appropriate target zones in the regions embracing LDCs (Table 8).

TABLE 8. TYPE OF PRODUCTION SYSTEM, TARGET ECOLOGICAL ZONES AND MAJOR CONTRIBUTING DISCIPLINES INVOLVED IN EFFECTING THE PRODUCTIVE POTENTIAL OF SHEEP AND GOATS IN THE LDC

Type of production system	Target ecological zone	Region	Major contributing disciplines
Tethering	Humid, subhumid and semi-arid	Southeast Asia, East and West Africa, Near East, Central America	Animal health Nutritional management Socio-cultural Systems analysis Marketing
Extensive	Arid and semi-arid	North and North-east Africa, Central America, Near East	Breeding and genetics Marketing Nutritional management Range management Socio-cultural
Intensive	Humid and subhumid, semi-arid	Southeast Asia, West Africa, Central America, Near East	Animal health Breeding management Marketing Nutritional management Systems analysis
Integration with cropping systems	Arid, and subhumid and humid	Southeast Asia, East and West Africa, Near East	Animal health Breeding management Marketing Nutritional management Systems analysis

The analysis is broad and is intended only to emphasize the scope for research. Disciplines are not given any order of importance, and the list may not be complete. Nevertheless it does serve to point out the significance and importance of each discipline in ensuring potential production from sheep and goats in LDCs. Effective application of these disciplines is likely to increase substantially the current low level of productivity of both species. While each discipline could have a significant impact on production, multidisciplinary involvement is essential to ensure an efficient use of existing resources compatible with maximum returns. In addition to the technical disciplines included in the Table, administrators should note that there has been too little development of delivery systems for services and technology to farmers, land tenure systems, and of marketing incentives to increase offtakes from both indigenous and superior genotypes.

The relatively low contribution of sheep and goats and their general neglect in LDCs in the past can be attributed to a combination of factors: low priority, poor infrastructure, limited financial support and inadequate planning to stimulate production. Associated with these limitations is the fact that technical assistance from developed countries and international agencies, including FAO, has been directed mainly at other classes of livestock. The task ahead therefore is to correct past tendencies and to promote maximum food production from sheep and goats. Essentially, this means effective use of the limited resources, and equating the importance of productivity to the nutritional adequacy of the ecosystem. Since the greatest potential for increased productivity from sheep and goats is in LDCs, the research programs with the greatest impact will be those that are implemented in LDCs *in situ* and which can obtain collaborative support from the developing countries with a demonstrable capacity.

Concluding Comments

The development of sheep and particularly goats in LDCs, both neglected resources, represents a new initiative. The initiative is timely because increasing the productivity of these animals represents a hope for improving the living standards of the undernourished poor people in these countries. Enlightened interest and a joint strategy for development should involve both developed and underdeveloped nations. Direct action is necessary to alleviate current problems of productivity, and to increase the efficiency with which existing resources are used to combat poverty. This challenging task promises real benefits in the future in terms of improved health, wealth and productive capacity of the developing countries as a whole.

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Not all Endangered Species are Wild

Charles Hickman

[Many domestic livestock breeds in developing areas are well adapted for survival in their particular environments, and could serve as the basis for breeding programs to raise the productivity levels of the stock. But this is not being done; and some of the breeds are just disappearing due to indiscriminate crossbreeding.]

More than 30 years ago, one of the founders of modern animal breeding practice, Dr. J. L. Lush, undertook to explain in a report to the UN Economic and Social Council (ECOSOC) some of the principal means of improving the heredity of farm animals. Some of the language used was a bit technical: "Progress per generation as a consequence of mass selection is expected to be the selection differential times the hereditability of the characteristics for which the selection is practised." But some of the conclusions were simple and straightforward: "The possibilities are complex enough that preserving and improving rare breeds should be encouraged." Whatever may have been the impact of Lush's report to ECOSOC, indigenous breeds of livestock in developing countries have remained largely ignored, or, if considered at all, have been judged by standards of performance established in industrialized countries.

Developing countries contain the predominant share of the world's livestock populations with about two thirds of the cattle, 60 percent of the pigs, more than half the sheep and nearly 95 percent of the goats. But output of meat and milk is another matter. About two thirds of total beef production and well over 60 percent of pigmeat production is accounted for by industrialized countries. Annual

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output from dairy cows in industrialized countries is more than four times higher per animal than in developing countries.

But such figures represent only one side of the story. Whatever their level of production, livestock in the developing world provides better nutrition, family income and employment opportunities to millions of families and villages, along with draft power and a more balanced form of agriculture. Moreover, they have demonstrated superior genetic ability to withstand harsh environments, including heat, humidity, tropical diseases and other challenges to survival at high altitudes or in marginal agricultural regions where the higher producing livestock of the temperate zones have found it difficult or impossible to survive. Yet it is only the livestock in the prosperous countries that have received the benefits of genetic improvement programs, and as a result possess genetic superiority in levels of production. It has proved difficult to develop breeds that combine genetic adaptation with genetic level of performance. This is a field meriting much more study if poor countries are to derive greater benefits from their livestock populations.

What is badly needed in developing countries is the institution of management programs which would direct and control selective breeding of indigenous livestock varieties in order to improve the breeds. This would include both raising productivity levels and selecting for maximum survival qualities, as well as keeping systematic records on the animals and their ancestries.

Perils in Crossbreeding

Experience and research thus far have provided two critical results. First, livestock breeds developed in temperate zones do not survive in radically different environments, such as the humid tropics. Secondly, crossbred offspring from low-producing native stock sired by high-producing non-adapted stock excel in level of performance in harsh environments.

The consequence of these two facts are as obvious as they are disastrous to the preservation of native stock. The urgency for achieving higher production levels encourages widespread crossbreeding, uncontrolled loss of native breeds, and the consequent loss of genetic ability to withstand severe environmental stress.

The dilemma arises from the fact that crossbreeds cannot reproduce in their offspring the hybrid vigor that they themselves exhibit. The superior performance is lost because it is dependent upon the matching of unlike genes from the two parental breeds. The highest benefit from this matching, known as heterosis, is obtained from the greatest genetic distance between parental breeds, in other words, in the first cross.

Any attempt to mate between first crosses, known as F_1s, results in reduced hybrid vigor and extreme genetic variability.

Before the process of genetic adaptation to different environments was clearly understood, many attempts were made to introduce exotic breeds from the temperate zones into the humid tropics. Most such projects ended in dismal failure because the imported animals died shortly after arrival in the harsh foreign environment, or their reproductive rate declined to the point that there was no replacement stock. This has applied especially to dairy cattle, but experience with exotic breeds of sheep and goats has been much the same. Among beef cattle there have been some useful introductions, particularly of new breeds formed from crossbred foundations. However, in well-controlled experiments, many native breeds have shown they could compete with, or even surpass the imported breeds in levels of beef production.

Unfortunately, most comparisons of performance made between indigenous and introduced breeds have been based on the methods and standards of industrialized countries. High individual performance and high feed input are principal criteria. Similarly, the potential for genetic improvement in indigenous breeds is often circumscribed by Western standards. There has been a tendency to avoid attempts at genetic improvement of indigenous breeds because of the lack of production data. Without such data, according to Western methods, a minimum population of 50,000 animals and a period of 30 years would be required to achieve an improved stock. Obviously, this would be a very stiff requirement for many native breeds, some of which simply could not muster that number of breeding females.

Improvement of indigenous breeds is further hampered by the fact that the more progressive farmers who are essential to the development of constructive breeding programs are often likely to be the very same ones who will be contacted by salesmen marketing semen from the industrialized world. This is not to argue that the use of artificial insemination based on imported semen should always be avoided in Third World livestock development programs. In many cases, it offers the only hope to an otherwise unprofitable livestock industry. The danger is that the decision may be made to import semen whether it is the best approach or not because there is a lack of data comparing improved indigenous breeds to crossbreds from exotic stock. There is evident need for a cooperative effort on the part of all international organizations involved in artificial insemination work to assemble sufficient data on which to base breed recommendations for local communities.

As might be expected, selection based upon high levels of production in a favorable environment produces a much different genotype from that of the same selection carried out in an adverse environment. Unfortunately, much more is known about the former process than the latter.

Only when more is known about the inheritance of adaptation will we be able to maximize the performance of F_1 crossbreds by ensuring that superior production animals are mated with animals possessing superior adaptation to harsh environments.

While some of the reasons behind the phenomenal superiority of the F_1 crossbreds are only now being uncovered, the need for adapted breeds to produce the desired heterosis has been recognized for many decades. For livestock producers or livestock ministries, systematic breeding programs that maintain a high level of heterosis represent a necessary part of a practical production system. For geneticists, it is a field of unlimited opportunity for breeding healthy livestock and for scientific research.

Breeder Organizations

One of the reasons why animal breeding technology has not been applied to indigenous breeds is because financial resources for breed improvement have not existed where these breeds are located. There may also have been some lack of interest, reflected in the absence or weakness of livestock breed societies. However, it is ironic that one of the reasons for the lack of breed organizations in the developing world is the poor reputation that breed societies encountered for a brief time in the industrialized world. Many graduate students from developing countries who were studying animal breeding in the industrialized world during the 1950s and 1960s came home with the impression that breed societies were harmful because they were putting far too much emphasis on breed type and show-ring standards than on performance characteristics. A new generation of scientific animal breeders in the 1950s and 1960s demonstrated beyond all doubt that many prize-winning animals of all breeds were actually below average in transmitting abilities for high levels of performance and breed societies at the time were held up to ridicule. But by the beginning of the 1970s, most had adopted objective performance recording systems and genetic improvement programs based on economic traits. However, in the developing world, the stigma of the old-fashioned breed society lingers on, and it is often difficult to convince well-placed officials that the impressions they gained two decades ago are no longer valid.

Gradually, however, the organization of farmer-breeder associations is being accepted as a modern alternative to breed societies. With this movement, it is possible that indigenous breeds can be put in good genetic condition for fair comparisons with exotics. But until such time as fair evaluations of particular indigenous breeds become possible, development agencies would be well advised to regard local stock as potentially important genetic material on which the development of successful domestic livestock industries will likely depend.

Production vs. Survival

The livestock industry might well profit from the experience of plant breeders who have already learned that high input and high production per hectare is not as important a criterion in the humid tropics as it is in temperate zones. With milking cows, for example, it has yet to be determined whether two native cows producing 2,000 liters of milk each per lactation are more economical than one exotic cow capable of producing 4,000 liters per lactation. Is the high-producing cow that has been selected for the short growing season of the temperate zone as suitable as two medium-producing cows that are adapted to a continuous growing season in the tropics? The answer can only be made in terms of survival probability or replacement potential. If the high producer has difficulty conceiving and thus has a long calving interval and dry period, her production per day of life is much less than her production per day of lactation. Unless production and reproduction can function simultaneously, production levels cannot be economically compared. In any environment, sustained production following regular reproductive cycles is the first prerequisite for economic livestock production.

The trade-off therefore must lie between survival and high production. There is no doubt that high production is in itself a stressful factor and particularly so in harsh environments. High production requires high metabolic activity and high heat production. In temperate climates, this metabolic heat can be more easily dissipated than is possible in hot and humid climates. When an animal fails to control its body temperature under the stress of high ambient temperature, high feed intake, close quarters and high production, its vital functions begin to fail. Tissue damage aggravates the situation, causing additional metabolic heat production and loss, through catabolism (molecular breakdown) of scarce protein precursors. Lack of coordination and physiological disability follow, causing a climactic prostration (exhaustion) and death in otherwise healthy animals.

Preserving the Species

Many countries are now aware of the importance of indigenous genotypes. Seed stocks of both plants and animals are being maintained, but plant geneticists are far ahead of animal geneticists in this regard. The conservation techniques involved, of course, are basically different. In plant breeding, conservation of germ plasm of almost all kinds is possible, whereas in animal breeding the management of populations of adapted breeds is essential. Since the natural zones of adaptation often cross national borders, breed management becomes more than a national concern. Too often a breed degenerates because isolated populations in different countries are not linked by an effective breed organization. The lack of such an organization often rules out fair evaluation of the breed. In the absence of an organization, native animals required for comparison with exotics are usually purchased at local markets. These culled animals are then taken to specially managed premises where the imported stock is adapted but local stock is out of place.

The situation is serious. In some of the once-famous breeds like the Sahiwal, no good breeding stock is available. The much acclaimed Shami goat, currently so profitable in family flocks, has no breed organization. Quality germ plasm, such as seed growers are providing in the plant sector, is not being provided from indigenous livestock resources because these populations lack the necessary management.

The urgency of filling this gap will become more evident as evaluation standards for comparing breeds and breeding systems become better suited to local conditions. If, for example, concentrated feeds are in short supply in a developing country, as they often are, livestock ought not to be evaluated with unlimited feed allowances as they are in the temperate zones. Severe feed shortages even in the humid tropics are not uncommon, and livestock there must be able to cope with irregular feed supplies. In hot dry climates, the stress on livestock is even greater.

A June 1980 consultation in Rome on the whole question of livestock genetic resources began setting forth some of the awesome requirements for maintaining adapted livestock populations. As in the plant field, international coordination is needed. To get this started at a time of economic stress means that it must be done without frills and with emphasis on the practical populations of farm livestock. This includes camels, elephants and donkeys whose development has been neglected because they are considered of little importance in the industrialized world. But with a changing energy picture, draft power may become as critical a criterion as meat or milk production in the selection of best-adapted livestock.

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Embryo Transfers

Judith Randal

[Artificial insemination revolutionized selective breeding; now, livestock scientists have developed techniques for embryo transfer that may match the impact of artificial insemination. The following article describes the mechanics and potential of these techniques.]

Before 1970--when left to their own devices--heifers never became pregnant. In 1980, however, an estimated 20,000 calves were born to unmated heifers. Under ordinary circumstances a cow can become a mother only once a year, but in 1979 a prize chestnut-and-white Simmental dam named Castille-156 produced 89 calves.

The explanation of the paradox is that a cow like Castille-156 bears none of these young herself. Instead, they are taken from her as speck-sized embryos and put into the uteri of other unbred cows whose monthly reproductive cycles coincide with her own. Although the substitute mothers are of undistinguished ancestry, the calves they deliver nine months later are purebred. The aristocratic cow serves as the reservoir of superior genetic material, just as the aristocratic bull does in the more common practice of artificial insemination.

This maneuver, called embryo transfer, is not new. It dates back to 1890 when an English biologist, Walter Heape, succeeded in making a Belgian hare produce a litter containing both purebred hare and purebred Angora young, and it has since been achieved not only in rabbits and cattle but in a variety of other species. It is only rather recently, however, that the technology has shown signs of becoming a major factor in animal husbandry.

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"The ups and downs of the cattle industry get most of the credit for this development," says George E. Seidel of Colorado State University's Animal Reproduction Laboratory in Fort Collins, one of 20 centers in North America that performed $20 million worth of embryo transfer procedures in 1980. "Beef prices were so low in the mid-1970s that many ranchers reduced herd numbers. Now that those prices have risen, embryo transfer enables a cow of superior bloodlines to produce more calves. Often that is the only way that a rancher can reestablish a quality herd in a reasonable length of time."

The situation in the milk industry is somewhat different than that in the beef industry because there is less tendency to introduce exotic breeds like the Simmental (a promising line of beef cattle) and there has been no shortage of dairy cows. Nonetheless, dairymen also are increasingly drawn to embryo transfer as they discover that it can increase the number of offspring from a cow of superior genetic distinction, fetch handsome profits from the sale of her progeny, or prolong the reproductive life of a valuable, injured, or aging animal.

"A cow that is a good milker is often middle-aged before the owner knows whether her heifers can be relied on to turn in the same desirable performance," explains James Evans, whose embryo transfer service at the University of Pennsylvania is one of the most active. "With embryo transfer, the farmer can make up for that lost time. In fact, whether the client is in the beef business or the dairy business, embryo transfer can compress into a few years what used to be a life's work of building a good herd."

How is it done? At first it was just a matter of breeding the donor cow, either naturally or artificially, and recovering her embryos three times a year, thereby tripling her normal calving ability. However, her productivity can be increased further by injecting her with follicle-stimulating hormones from the pituitary glands of slaughterhouse animals or gonadotrophin from the blood serum of pregnant mares. Both of these hormones are used also in the treatment of human infertility and either one will "superovulate" the cow, causing the ovaries to release more than one egg. When the cow is bred, most of these ova are fertilized.

A few years ago it was standard to collect the embryos surgically, but this practice has been abandoned because of the considerable risk that the operation will compromise the cow's future fertility. It is safer to introduce buffered saline solution into the reproductive tract and wash the embryos out. Using this method, an animal can serve as a donor repeatedly and be none the worse for wear.

One June morning, for example, a superovulated Simmental that had conceived the week before in West Virginia arrived by truck at Evans'

New Bolton Center treatment barn. There she was led into a narrow stall and given an epidural, a kind of spinal anesthetic also used in human obstetrics. Evans put on a shoulder-length plastic glove and reached through the rectum to examine the cervix and uterus. At about one two-hundredth of an inch in diameter, the embryos were too small to be felt, but by examining the nearby ovaries Evans could tell that the cow was pregnant. He introduced a long, flexible latex catheter into the uterus and forced saline fluid through it. As the fluid drained out, it carried embryos with it. In an hour, her uterus flushed ten times, the Simmental was back on the truck and ready to leave.

An assistant searched the fluid for embryos. As he located each one, he sucked it up in a glass pipette and placed it in a separate receptacle to be reexamined. Only embryos that look healthy over the course of several hours--as all of these did--are retained.

The heifers that would receive the embryos were waiting in the wings. All of the mothers-to-be were unpedigreed Holsteins, because the breed has wide hips that facilitate delivery of the large Simmental calves, and because Holsteins have placid dispositions and a generous milk supply. Each heifer was confined in standing position and examined, as the Simmental had been, to locate the ovary that had been active in estrus. Using local anesthetic, a six to eight-inch incision was made in the flank on the same side as the heifer's producing ovary.

The embryos had been placed individually into long, thin, metal tubes fitted with a plunger. As each tube was inserted through the incision of one of the Holsteins and the plunger pushed, an embryo was deposited in her uterus. The heifer was now pregnant, but it would be 40 days before Evans could be sure the embryo would survive.

A new technique was added to cattle embryo transfer with the birth last June of the first "test tube" calf at the University of Pennsylvania's New Bolton Center. Holstein egg and sperm were combined in a glass dish and transferred to a recipient cow. Since less sperm is needed for *in vitro* fertilization than in artificial insemination, a single bull can thus produce more offspring.

Currently, the cost of an embryo transfer--about $2,000 per recipient--is greatly increased by the need to keep 20 potential recipients on hand for every embryo. Cows ovulate every 21 days and the donor and recipient can be no more than 24 hours out of estrus phase. Since all those recipients must be kept in top reproductive condition while awaiting pregnancy, this does not come cheap. This cost can probably be considerably reduced, however, when the following methods are used. The recently marketed drug prostaglandin F_2alpha resets the timing of the reproductive cycle, eliminating the need to keep so many reserve animals (the drug must be administered before the recipient needs are known).

Also, freezing the embryos in liquid nitrogen makes it possible to store fertilized eggs and match them with recipients in natural hormonal readiness at the breeder's convenience. Healthy calves have already been born from embryos kept for a year of suspended animation in a freezer, and similar trials in goats and sheep have resulted in the birth of normal young. Pregnancy rates after the transfer of frozen livestock embryos are less than half those with unfrozen embryos; but simpler, more effective freezing methods are being sought and will cut the costs of embryo transfer drastically.

Embryo transfer is already sufficiently flexible to be paying some surprising dividends. One of these is that it is ideal for quickly testing bulls for undesirable but hidden traits that they might transmit to their progeny: for instance, hereditary dwarfism and hoof deformity. When a cow can be made to superovulate and the resultant eggs are fertilized by semen from a test bull, the question of the sire's genetic makeup often can be resolved in a single year. Since some bulls commanding high stud fees contribute their gene pool to hundreds of calves, a great deal of money can ride on the outcome of the trial.

Embryo transfer also is being used in pig breeding. Two American veterinarians, Jason James and Philip Reeser, worked with sows that had grown too old to be broodsows but could continue to conceive when they were inseminated. By recovering their embryos and surgically transferring them to younger females better suited to motherhood, James and Reeser were able to prolong the productivity of genetically superior procine dowagers by an average of 50 offspring each. Some of these elderly sows have served as embryo donors as many as ten times.

Farmers in many countries are eager to improve their livestock but generally are not permitted to import animals for breeding because of the risk of communicable disease. The fertilized eggs are thought to be protected from many of the infections that newborn calves and piglets can pick up from their mothers. Besides, cattle and swine travel far more cheaply as embryos, and they probably are healthier if born into the circumstances in which they will spend their lives. On the other hand, embryo transfer takes a great deal more time than importing livestock. Cattle and sheep embryos have been shipped from Britain, the United States and Canada to many parts of the world.

Although the broad principles of embryo transfer are the same for all mammalian species, each species has its secret differences that only persistent study will disclose. Medical researchers would like to have embryo transfer technology provide them with a plentiful supply of animals--particularly primates--to serve as study models of human disease.

Wisely deployed, embryo transfer technology can speed up the generation of both valuable information and valuable animals. Foolishly deployed, it could become a faster way to make potentially serious mistakes.

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Raising Chickens in the Bush

Stephen Frye and Donna Gessell-Frye

[Chicken production, both for eggs and meat consumption, can be a relatively small-capital, labor-intensive venture in rural areas or near towns. The following article describes how to establish, maintain and reap benefits from a chicken-raising project.]

Local fowl in Fiji, as in many parts of the developing world, run around free in almost every village. These birds are strong in survival instincts, but have very little meat, lay few eggs, and the eggs they do lay are usually hard to find. In addition, there is a high mortality rate among these birds because mongooses and rats can consume a majority of the young chicks. Attempting commercial management techniques with these chicks, such as enclosing them or giving them commercial feed, is simply not economical. However, raising commercial birds on commercial feed in the bush can be a paying proposition, and can be done on a small scale within the means of the local farmer, while utilizing locally available resources.

The system of raising chicks described below can be used as a good starting point, and can later be expanded if desired. It is a small-capital and labor-intensive venture and can provide a quick turnover of money and supply a steady income. There is a definite risk involved, as disease or disasters can dramatically reduce the flock and wipe out the profits, but with the proper management and care this risk can be minimized.

If you decide to keep chickens, the first thing to check out is the market. In most villages, a market can

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be developed because most people want chicken meat and eggs if they are available at reasonable prices. If your area is near a major town, you might have trouble competing with the larger commercial farmers, although this might also offer you a larger market later after you learn the business. Some adding and subtracting will determine the cost, and a check against local prices will indicate whether chicken-raising looks feasible.

Before starting a chicken project, you have to decide whether to grow meat birds or egg layers. The major advantage of meat birds is that they are quick to raise because they are of a marketable weight and size at nine weeks of age. They are a bigger risk than layers, however, because they are more susceptible to diseases, which can keep them from gaining their maximum weight. Also, the market for these chickens may be more sporadic where most meat in the village is consumed for ceremonies or semi-special occasions, so it may take you three to four weeks to sell the flock. Because meat birds provide a quick turnover for your money, you may want to start with them in order to raise the capital for layers.

The big disadvantage of the layers is that there is a six-month wait before you see an egg. But when they do start laying, you should have a steady supply of eggs for at least a year. Raising layers can contribute to village health because the eggs will find their way down to the younger children before the meat will. Eventually you should try both meat birds and layers; if you master the subject, you'll recover your investment and even make some money to reinvest.

The Brooder

The day-old chicks can be acquired from a hatchery. This is the best method, as opposed to hatching one's own, because the equipment to run a hatchery is expensive and cannot be used to raise the chicks once hatched. [Note: We are assuming here that a hatchery is in operation in your country where selected breeds of good producing chickens, well graded and of reliable quality, can be bought for a reasonable price. If this is not true, much of the advice given below will not apply.] The laying chicks should have been sexed at the hatchery so that the farmer should receive females only, but he can expect 2% of the order to be males due to error. Although a rooster helps to keep the layers in line and stop fights, he is not necessary for the hens to lay eggs. They do add to the noise problem, and fertile eggs spoil faster, so it may be wiser to dispose of the roosters. Getting rid of the rooster may lead to many conversations trying to convince people that he is not needed for the hens to lay. The hatchery should give layers the vaccinations necessary for a healthy flock (discussed below). Meat birds come in both sexes and this is acceptable because they will be sold before the roosters can cause any problems. The meat birds do not automatically get the vaccination, but these vaccinations can be given for an additional charge. Where they are sexed and automatically vaccinated, layers are more expensive than meat birds.

Chicks do not need food, water, or heat for about 24 to 48 hours after hatching so this is the perfect time to transport them. The chicks should come in a box, litter-filled, with holes for ventilation; one box generally holds over 50 chicks. Care must be taken to keep the boxes level, especially if transportation is going to be a long and involved process. It is imperative that the boxes stay dry at all times. Water, food, and heat must be provided after the 24-to-48 hour time period, or as soon as they are settled, whichever comes first. If at all possible, the chicks should be in their home by the end of the 48-hour period.

The brooder is an enclosure for the young chicks that is equipped to fulfill all the responsibilities of the mother hen. It must be warm, dry, and mongoose and rat proof. If a small chick gets cold or wet, it is likely to die. If a large enough crate can be found, it will work well for a brooder. If not, an enclosure can be made by placing a few boards in the corner of the house to form a box. The walls should be approximately 500mm (20in) high. The enclosure or box should be lined with old cardboard boxes around the walls and on the floor. Corners should be rounded out with the cardboard because chicks tend to lie on top of each other when cold, and the ones on the bottom in a corner can be smothered. One of the easiest ways to keep the chickens safe and well is to put the brooder inside the farmer's house. The presence of people will scare away a mongoose, and the effort of building a fortress-like brooder will be saved. An inside brooder is also easy to keep dry and draft-free.

The floor of the brooder should be filled with some litter material 75 to 100mm (3 to 4in) deep. The cardboard under the litter will help when it comes time to dismantle the brooder and clean up. The litter provides insulation and comfort for the birds and also absorbs their droppings. Dry and dustfree materials such as peanut hulls, rice hulls, fresh sawdust or shavings, cane pulp, bagasse, or dry sand will work. Sand is especially good because it helps develop the young birds' gizzards. Laying paper on top of the litter when the birds arrive will help the chicks differentiate between the litter and their food, and will also add a little extra insulation. Adding an extra layer of litter after three or four weeks will help prevent odors.

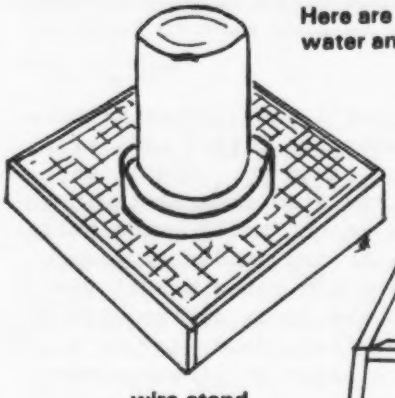
Warmth. The chicks must be kept very warm. In their first week they prefer a temperature near 35 degrees C. (95 degrees F.). The temperature can be lowered about 3 degrees C. (5 degrees F.) each week thereafter until they are totally weaned from the heat to the local temperature. In some areas, two kerosene lanterns burning night and day are necessary at the beginning; as the chicks' need for heat lessens, one lantern may be used continuously, and finally one lantern just at night will do. These lanterns can be simple kerosene storm lanterns, or electric light bulbs. A metal cover of some type, such as a sheet of roofing iron, can be added to the brooder to keep the heat in.

The easiest way to judge the temperature in the brooder is to watch the chicks. If they are bunched up against the lanterns, then they are too cold. Conversely, if they are spread out to all corners of the brooder they are too hot. An equal distribution around the entire area is ideal. An uneven distribution is an indication of a dangerous draft. If the chicks get too hot then they will start to "paste up," that is, the feces will stick to the rear end of the chicks. When pasting occurs, the feces should be washed off and the heat reduced. Overheating causes dehydration and can kill a chick if allowed to continue. The chicks should feather out and be weaned from the heat after a four-week period, or less in the hot season.

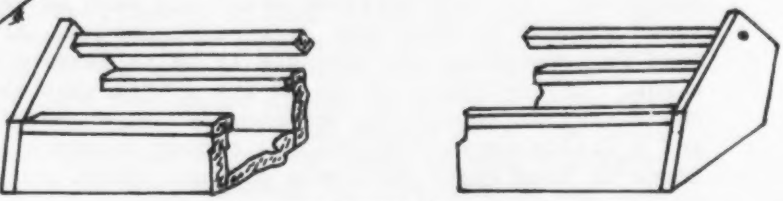
Feed and water. The brooder must contain feed and water. For the first few days, egg cartons or plates may be used as feeders. These first feeders should not have sharp points on their edges which can prove deadly to young chicks. The chicks will eat and sleep in these containers.

As the chicks grow a little larger, the feeders must be constructed so that the chicks cannot walk around in them and dirty them. Feed loss can be reduced by making sure there is a lip on the feeder. This helps prevent spillage and waste as the chick pulls the feed toward itself. The feeder should be designed so that it can "grow" with the chick; the lip of the feeder should always be at the same level as the back of the chick. The illustration below shows how to construct two easy-to-build feeders.

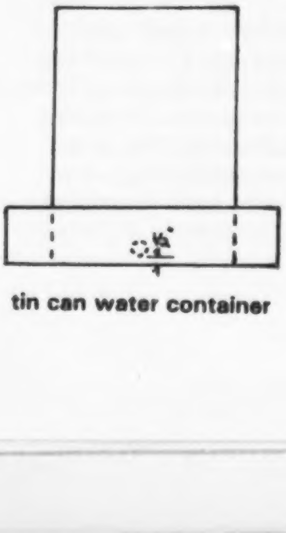
Here are examples of easy-to-build water and feed containers.



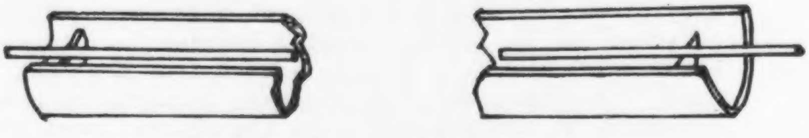
wire stand



feed container made from wood



tin can water container



feed container made from bamboo

From the start, the water containers must be built so that the chicks cannot get into them and get their feathers wet. It is helpful to design them so that the chicks cannot get on top and dirty the water from above. The water container should also be adjustable to "grow" with the chicks. Placing the water container on a wire stand as the birds get older helps to prevent wet litter. The water container should be rinsed and refilled at least once a day to provide the chicks with a steady supply of clean water. This is necessary to prevent dehydration and disease.

This day-old chick is drinking from a water container designed to keep the chicks out.

Other problems that can occur, especially as the chicks get older, are toe-picking and feather-pulling. These habits can lead to cannibalism and death. These problems can largely be avoided by keeping the litter clean and by providing adequate amounts of clean water and feed. Suspended newspaper strips, empty tin cans or lids, anything that will attract their attention and encourage them to peck at it, especially any bright, shiny objects will divert the chicks and reduce problems. But if the chickens continue to attack each other, debeaking may be necessary. Debeaking can be done at any time, but it is best done between the second and sixteenth week. It consists of cutting off half of the upper beak and just the tip of the lower beak to blunt it. To avoid bleeding, the beaks must be cauterized using a red-hot nail or knife. If cauterizing is not possible, then only a small portion of the upper beak should be cut, a temporary measure which will have to be repeated when the beak grows back. If the chickens are to range, however, they should never be debeaked.

Meat chicks should stay in the brooder until they are four weeks, and the layers until six weeks of age. This period in the brooder is the most crucial time in raising chickens. This is when the greatest mortality occurs, so it is most important to keep the chick's surroundings dry and clean and to make sure they have ample feed and water.

The Coop

When the chickens are weaned from the heat and are large enough not to fall through the slats, they can be moved into their chicken coop. The requirements for the coop differ somewhat from those for the brooder, but again the chickens must be kept dry and safe from predators. Their surroundings should be clean and disease-free.

There are several methods of housing chickens, but not all are totally satisfactory. For example, continuing the use of a deep litter is not satisfactory because the litter exposes the chickens to their droppings where diseases breed. These diseases breed especially fast in the tropics. But raising chickens on a range system, or running free, also has disadvantages, because the chickens become easy targets for mongooses and rats. Because commercially desirable chickens have been bred to lay a great quantity of eggs or to gain a great deal of weight quickly, they have lost the ability to live in surroundings closely resembling natural conditions. Also, chickens do not have the ability to sweat, and therefore have a limited ability to cope with high temperatures, making it important to keep their environment as cool as possible.

A house with a slatted floor raised above the ground is the most efficient type of coop for tropical bush conditions. The chickens are raised up away from the dangers of mongooses and other predators, and the chicken droppings fall through the floor out of the chicken's reach. The raised floor also facilitates the removal of the chicken manure, which is a valuable fertilizer, especially for tropical soils. A raised house also reduces the need to stagger batches because of reduced disease incidence.

Location. The first question to consider when building the coop is location. The coop should be at least twenty meters away from any house because a chicken coop attracts flies. The coop should be built in a spot protected from any strong winds that might blow through it. A further consideration is the convenience of transporting bags of feed and water to the chicken house. If you're raising meat birds and layers in the same area, the two varieties should be separated by at least two hundred meters because layers harbor diseases that could be disastrous to meat birds. Also, different age groups of the same kind of bird cannot be placed in the same coop.

Construction. The floor size of a raised house should allow a minimum of 4 laying chickens per square meter (2½ft^2 per layer) or 10 meat chickens per square meter (one per ft^2). In the tropics, more room should be provided, if at all possible. The floor must be at least a meter off the ground and the roof of the house one meter above that. Before starting construction, the ground underneath the coop should be prepared by putting down a layer of compacted clay. This will make it easy to scrape the chicken manure out from underneath the coop. Ditches should be dug around the coop to keep the site drained.

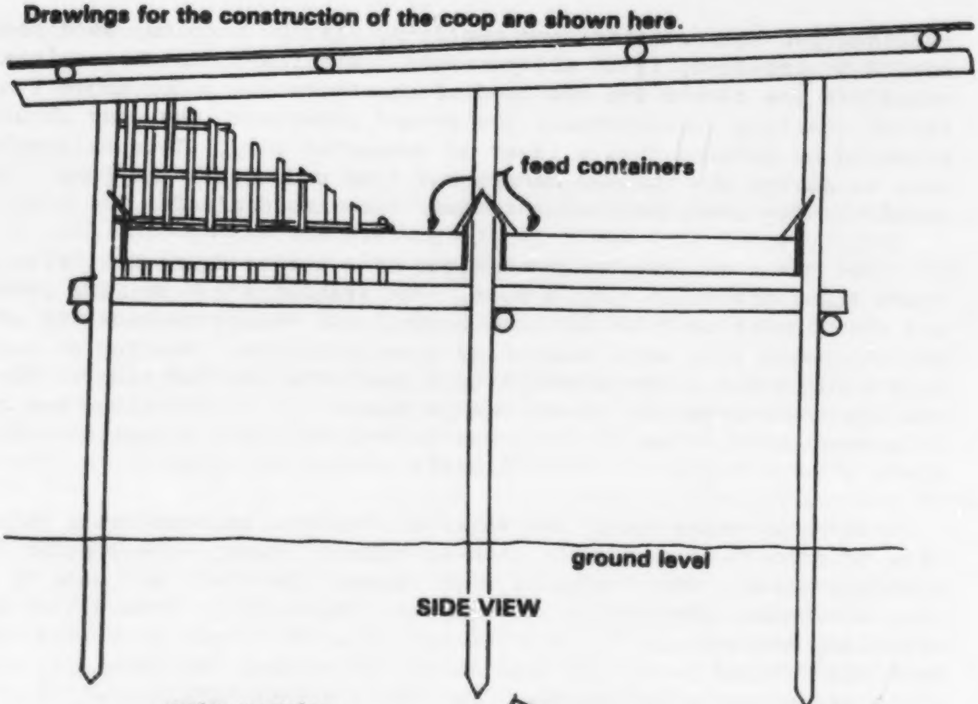
The basic chicken house consists of a wooden framework, with open-weave floor and walls, and a roof. The framework can be made from posts and sawn lumber or from all bush woods. The structure consists of six upright posts with wood connecting them widthwise. Running on top of this wood is the understructure to support the slatted floor. The wood for the understructure should run perpendicular to the slats and should be spaced every 600mm (2ft.). The roof should have a similar understructure for support. (See illustration on next page.)

The open-weave floor and walls can be made of commercial chicken wire or from local materials such as bamboo, reeds, or any other small straight poles. When building with bamboo, the slats are made by splitting the bamboo lengthwise into sixths. Openings of 40mm (1½in) are necessary between the floor slats to allow the droppings to fall through. Each slat should be nailed separately, otherwise, chickens will move the slats around and make escapes. The walls attach to the post with a slat spacing of 40mm to 60mm (1½ to 2½in). The slats should run vertically, allowing the chickens to reach the feeders outside. These open walls also provide excellent ventilation to keep the chickens cool. A few horizontal slats woven in can help to hold the entire wall together, and to attach it to the structure. If using chicken wire instead of slats, use 40mm(1½in) wire and nail it to the framework. Although using chicken wire makes the coop easier to build, it is far more expensive than local materials, and chicken wire can cause unsightly breast blisters on meat birds, something that bamboo does not.

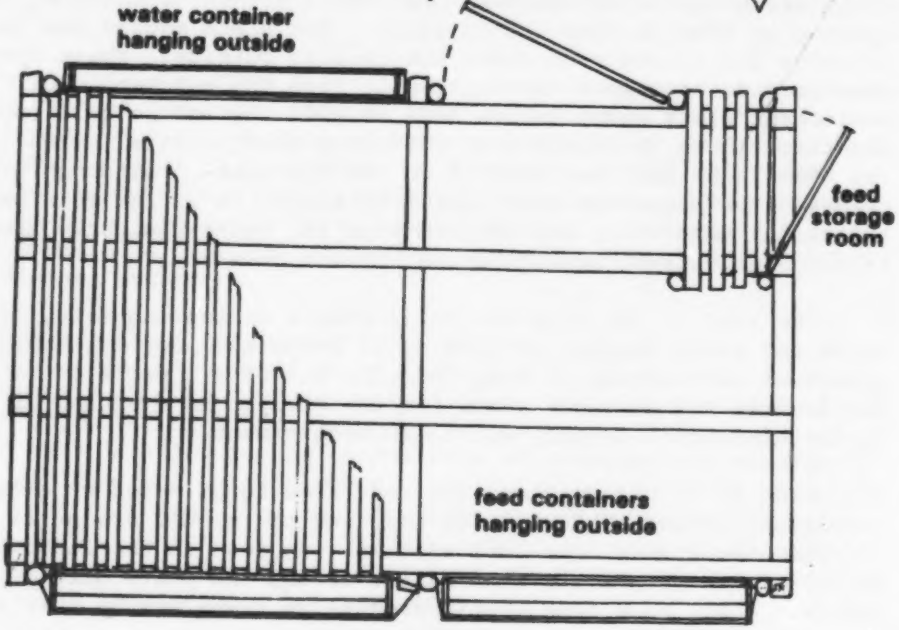
The roof of the coop can be as simple as roofing iron, or it can be of any local design, as long as it keeps the coop dry inside and has enough of an overhang to keep the rain out of all parts of the coop and the feeders and provides shade for the birds. An overhang of two feet is the minimum to satisfy all these requirements.

Even after the chickens are too large to be eaten by rats, rat guards on the poles between the coop and the ground are still necessary. If given the chance, the rats will eat the feed in the feeders. 30mm (12in) of tin or old tin cans nailed around the posts make good rat guards. Also, take care that there are no trees nearby that a rat or mongoose can climb to jump onto the coop.

Drawings for the construction of the coop are shown here.


feed containers
ground level

SIDE VIEW


water container
hanging outside
feed
storage
room
feed containers
hanging outside

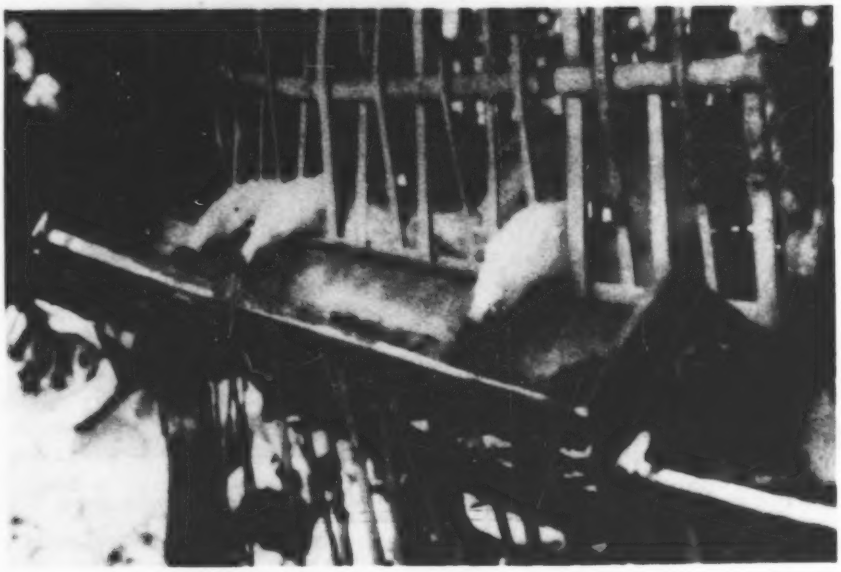
TOP VIEW

Feeders. For ease in feeding the chickens, it is helpful to have the feed in the same building. It is a simple matter to build a small storage room at the end of the chicken house. It must, however, have substantial walls to separate it from the chickens. These walls could be made of bamboo, but with a tighter weave than the rest of the walls of the coop. As not more than one month's supply of feed can be kept at one time due to pests and the loss of vitamin potency, the room does not need to be very large, about 450mm x 1m (1½ x 3½ft) will do. This area has to be kept dry because the feed will rot and mildew if wet.

The feeders and water containers are best placed on the outside of the coop in such a manner that the chickens can stretch their heads through the slats to eat and drink. This not only keeps the chickens from walking or roosting in them, thus reducing the amount of cleaning necessary and the waste of feed; it also makes it more convenient to watch and fill the feeders.

The feeders may be made of two long pieces of 6x1 inch wood nailed together edge to face to form a long trough. Since a great deal of feed can be spilled out the ends, it is wise to extend the end plates above the rest of the trough. The feeders must have some kind of lip on the edge near to the birds.

To prevent spillage, the feeders should never be filled more than half way full. The bigger the feeders, the less often they have to be refilled. However, they cannot be too deep or the chickens will not be able to reach inside. An extra piece of bamboo or wood inside the coop, running parallel to the feeders, will make it easier for the chickens to



This feed trough is made from 15.5cm x 2.5cm (6in x 1in) boards nailed on edge, with a bamboo lip nailed onto the side close to the hens.

stand facing the feeders while they eat. The feeder should be mounted so that it can be moved upwards as the chickens grow. The chickens will work hard to keep the feeder box clean all the time.

The water containers can be made of bamboo hung on the outside of the coop. They should be on the opposite side of the coop from the feeders so that feed does not get into the water. Containers should be removeable for easy cleaning. The bamboo should be about 100 to 150mm (4 to 6in) in diameter.

A bamboo trough is used to supply water to the birds. They should always have clean water available.

The maintenance of the coop is relatively simple. The water containers need to be cleaned out once a week or whenever scum starts forming in the water. The chickens will take care of keeping the feeders clean. About once every three to four weeks, the storage area for the feed should be cleaned out with a disinfectant in order to break the cycle of bugs and maggots in the feed.

The manure underneath the coop should be gathered up and used at least once every six days to disrupt the breeding cycle of the flies. Bamboo can be used to make a scraper for scraping up the droppings.

If the coop is to be reused for another flock of chickens, it must be thoroughly cleaned with a disinfectant before the new birds are placed in the coop, so that no diseases are passed on to the new flock.

The Feed

The question of whether it is better to raise chickens on commercial feed as opposed to local feeds, is mainly one of economics. Mixing feed from local materials is cheaper than buying commercial feed, but is time-consuming work with an uncertain outcome. The biggest problem is combining the proteins and minerals into a balanced mix that the birds can fully utilize. Raising a food crop specifically for use as a protein source for the bird feed may or may not be practical.

One way to utilize local feed is to raise the chicks on commercial feed for six weeks, and then supply them with local feed and let them "range," or run loose. This lets the chickens balance their diets by pecking for what is missing in the local feed. However, besides the obvious problems with predators mentioned before, this form of management will also affect the birds' production. They have to work for their food, using up energy that would otherwise be used for growing or laying, and may not be able to fill all of their food needs.

Unfortunately, the mixture of artificial feed with local feed does not often work out, because it usually mixes up the protein levels of the feed so that the birds cannot utilize all the protein they consume. By supplying all the feed requirements of the chickens with commercial feed, raised houses can be used efficiently because the birds never need to leave the coop. There is also a better feed-consumption/weight-gain ratio with the carefully balanced feeds.

Some of the ingredients in commercial feed are: molasses, sorghum, peas, coconut meal, maize, tallow, milk powder, meat and bone meal, bran, pollard, bloodmeal, fish meal, soya meal, pea meal, a vitamin premix, and a mineral premix. The feeds generally come in three forms--pellets, crumbles and mash. Crumbles should be used for the young birds in the brooder where the bits that fall into the litter can be utilized.

Mash is similar to corn meal in consistency, and although it is sometimes cheaper to buy, more is wasted. The most economical way of feeding the older birds is pellets--because of the compact form, there is less waste. The young birds, however, are unable to eat the pellets because the pellets will stick in their throats.

There are different feed programs for meat birds and layers. The meat birds should be fed a high protein feed (21%) from the time they are one day old until they reach four weeks of age. The chickens grow quickly, producing their most dramatic weight gain during this period. A reduced protein content feed (18%) should be used after four weeks and until the birds are sold. All of the feed for meat birds should contain a coccidiostat to prevent coccidioses from breaking out in the flock.

For the first six weeks, the layers should be given a 20% protein mix to ensure quick growth. It is the only layer mixture that need contain a coccidiostat. During the five-to-seven week period, the chickens should be switched to a 16% protein mix. This feed should be used until the chickens reach the laying stage. It is important to change promptly to a layer feed when the first few eggs are seen, usually around the twenty-first or twenty-second week. This feed should have the extra calcium needed for the production of the egg shell. It should not be given too early, however, or it can cause kidney problems.

As the birds get large, their feed consumption increases dramatically. It can be assumed that a broiler will consume 6 kg (13 lbs) of feed before it is ready for sale. All the feed calculations are approximate, because feed consumption can be influenced by factors such as the strain on the birds, their general health, and the temperature of the coop. Careful records of the feed consumption should be kept to provide a clear understanding of the costs and profits of raising chickens in a particular situation.

Broilers

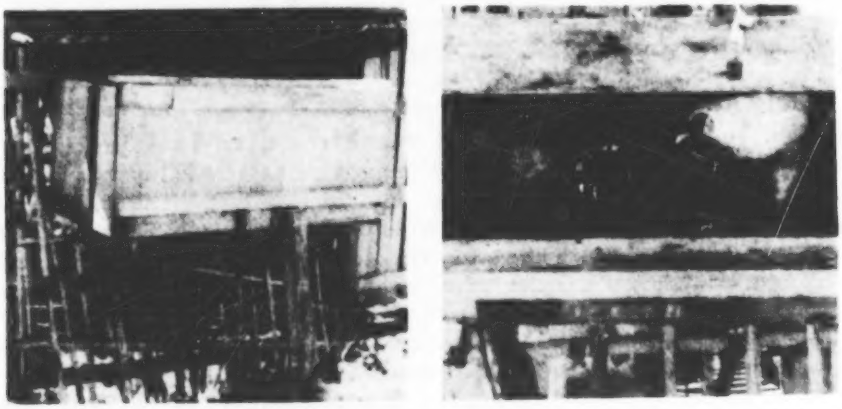
It is usually most profitable to sell meat chickens as young birds of small size called "broilers." After eight to twelve weeks, the broilers' rate of weight gain slows down to the point where it no longer makes sense economically to continue feeding them. If there is any shock or strain on the chicks, the weight gain will be permanently slowed down. If the shock is unavoidable, then a solution of multivitamins dissolved in the water can be helpful to reduce the effects. Also, more care with the flooring is needed because these birds have thicker but weaker legs than layers and are more prone to leg and hip problems. The weight they are allowed to reach should be determined by the local market. The efficient feed/weight ratio is usually reached when the birds are 2 to 2.5 kgs (4 to 5 lbs).

It can be beneficial to the village to raise one or two hens to interbreed with the local stock. This will strengthen the local breed, combining their native instinct for survival with the commercial birds' ability to gain weight fast. The offspring will not be as efficient weight gainers as the commercial birds, but they should be able to better survive the local conditions.

Layers

As the layers approach their twenty-first or twenty-second week they should start laying eggs, and by the twenty-sixth week they should be at 50% production (100% production would be one egg per hen per day). As the layers grow older, they can be expected to lay 70-80%. When young, chickens lay many small eggs, but gradually, during the following year, switch to laying fewer but larger eggs. To make efficient use of the eggs, the farmer must recover all the eggs that are laid. Frequent collection of eggs, and a proper laying place increases the efficiency of egg production.

The hens need a place that is dark and cool and filled with clean, dry nesting material. The nest should be easily accessible--both for the hens and for easy egg retrieval and cleaning. To save floor space, the nesting box should be raised about 1 meter (39in) above floor level. A roost must be placed in front of the box so that the birds have something to land on when they fly up to the box to lay; this can be a wooden stick small enough for the birds to grasp. One possibility is to use a crate for a nesting box. The crate can be built if one is not available. The advantage of using a crate is that the back side can hang outside of the coop and be hinged, so that the eggs can be removed and the nests can be cleaned from the outside. Thirty birds need one



The nesting box viewed from the outside where the eggs are removed The box is placed high so it doesn't take up floor space, and the chickens enter through the two holes after first landing on a perch built on the other side.

square meter (3 birds/ft^2) of nesting area. At least two holes 200mm (8in) in diameter are necessary for the entry of the chickens. A lock can be put on the box to secure the eggs from the prying hands of children or others.

Clean nesting materials, periodically replaced, must be kept in the nesting box. If too little nesting material is used, eggs are likely to break. This leads to the hens eating eggs, a habit that once started is hard to stop. An extreme solution to this problem is debeaking.

The openings to the box should be covered up until a couple of eggs are seen in the coop. It may be necessary to induce the chickens to go into the box for the first time by hanging shiny objects in the case so that they can be seen from the coop floor. Chickens raised on a slat floor will always go to the softly nested box to lay eggs. However, it is sometimes necessary to encourage the hens to return to the box in the beginning of the laying period. This can be accomplished by leaving an old light bulb or a stone resembling an egg in the box. They will mistake it for yesterday's egg and will continue to lay there.

During the laying period, the birds will consume a great deal of food. If their food supply is disrupted or their health impaired, egg production will be affected. Therefore, it is important to keep the birds healthy and well-fed during their entire laying period. Since a major part of the egg is water, it is equally imperative that clean water always be provided. A disruption of water supply, or too much dirt in the water can also affect egg production.

Culling. It is sometimes necessary to cull (remove) the non-producers from a flock. Because of the cost of supplying feed to the birds, you cannot afford to feed a bird that is laying few or no eggs. Care should be taken before deciding to kill the bird, however, because many times the bird is just in a rest period and may soon resume laying eggs. It might be wise to isolate and observe the bird for a while before making the final decision.

There are several signs that tell whether a bird is laying a great many eggs or just a few, and how long it has been laying or not laying. Looking at the pigmentation of the bird should indicate how long it has been laying. As the bird starts to lay eggs, the yellow pigmentation is diverted from the chicken to the yolks. This bleaching of the different parts of the body occurs in a definite order, and can indicate how long the bird has been laying. The vent (i.e. anal opening) bleaches out in the first few days, and the eye rings follow. After approximately three weeks the ear lobes bleach out, and then the beak. If a bird stops laying, the pigmentation returns to these body parts in the reverse order.

The chart that follows gives signs that indicate whether the hen is a high or low-egg producer.

Body part	High producer	Low producer
Vent	bleached, large moist	yellow, dry, puckered
Pelvic bones	two fingers apart	close together
Eye rings	thin, bleached	thick, yellow
Beak	bleached	yellow
Plumage	worn, dry, soiled	smooth, glossy unsoiled
Comb and wattles	large, red, prominent	small, pale, scaly
Back	wide all the way to the pubic bone	narrow, tapering to the rear

Moulting. After ten to twelve months of laying, the hens will go into moult, replacing their old feathers with new ones. The better the layer, the later the moult will be. During the moulting process, the hen will not be laying eggs, and after the moult the second year, the amount of eggs will drop, but the egg size will be larger. Some growers sell their flock at the end of the first year and buy a replacement flock, while others keep a highly productive flock for two years.

Health of the Flock

When raising chickens, the saying "an ounce of prevention is worth a pound of cure" is well worth remembering. If the stock is vaccinated, the surroundings kept clean and dry, and water and feed always provided, then the chances of disease are greatly reduced. A disease in the flock can be detected by a drop in feed consumption, followed by a drop in egg production, and sickly appearance of the chickens, who eventually die. Under tropical conditions, even when raising a healthy flock, a certain loss is to be expected, somewhere between 5-10% per year.

The first step towards a healthy flock is to make sure that the chicks are vaccinated. Major diseases may include Marek's Disease and Fowl Pox. Both of these diseases have no cure and the only method of prevention is vaccination. Marek's Disease causes a paralysis that freezes one leg in front of the body and the other behind. The vaccination is 80% effective. Fowl Pox causes black growths on the back of younger birds and on the combs of older birds. It can affect the growth or the laying cycle of the bird.

Another disease problem is coccidiosis, a parasite that is picked up from chicken droppings. If the chickens are raised above the ground and removed from their droppings, there is still a chance that they will contract this disease. If the spacing of the floor slats is not sufficient, and not enough of the droppings fall through, then the chickens might get coccidiosis. Chickens with coccidiosis start by looking sickly. Their feathers are rough and dull, they have little vitality, and their feed consumption drops off. The birds stand hunched over, with their tail feathers drooping. The birds appear as if chilled, crowding together in smaller bunches. Blood usually appears in the feces, and soon after the birds die. Those that survive will be immune to the disease thereafter. The treatment for the disease is a coccidostat, which is basically a sulfa drug. The commercial feed for the meat birds contains a coccidostat, so it should not be a problem in raising broilers.

Another possible health problem with chickens is worms. Here, also, raising the floor and separating the chickens from their droppings greatly reduces the chances of their getting sick. Roundworm is the internal parasitic worm that gives the most problems. The symptoms are similar to those of coccidiosis, but there is never blood in the feces and very rarely is it fatal. A piperazine compound given in the water will clear up the worms. Usually one worming is enough if the chickens are on slats.

It cannot be over-emphasized that if the birds are managed properly, provided with a clean water source, raised up on slats, and supplied with the proper feed, there is little chance of an outbreak of disease.

[Note: This article was written for conditions in Fiji; in other areas, different diseases may be found--for example Bluecomb, or Newcastle disease.]

Records

It is important that comprehensive records be kept of all chicken projects, especially the pilot project in an area. A simple account should include all money spent on the project and all money received, so that one can see whether a profit is being made and, if so, how large a one. This helps not only to determine the feasibility of raising chickens in a particular setting, but also to indicate where small changes may be needed to make the operation more profitable.

The records should include all costs: everything from the cost of chicks and feed, to kerosene and litter for the brooder, to housing costs when the chickens are put outside. Another important cost that can make or break a small operation in the bush is the cost of transportation, which must always be kept down to a reasonable level. Transportation costs include transporting the chicks, their feed and other necessary items to the site, and transporting the chickens or eggs to market. In computing the potential income, it should be remembered that the layers can be sold for meat at the end of their egg laying. Also, all eggs eaten by your family should be recorded as possible profits.

[Edited extract from Raising Chickens in the Bush, a pamphlet published by the U.S. Peace Corps, Fiji, 1981.]

N AN ECHNOLOGY

WOMAN BAGGING RICE AT THE
GBEDIN RICE PROJECT IN LIBERIA.
(PHOTO: FAO -- G. TORTOLI)

Women, Technology and the Development Process

Krishna Ahooja-Patel

[This paper delineates the significant elements of inequality of access to technical education and technological knowhow between men and women, and the need for policy measures to improve the technological knowledge and skills of women for higher productivity.]

The World Employment Conference sponsored by the International Labor Organization (ILO) in 1976 set out to consider the mechanism by which the developing countries could satisfy their basic needs for essential goods and services. The report to the Conference analyzed the policy measures that would be necessary for the family and the community to obtain adequate food, shelter, public transport as well as health and education facilities. The main instrument to achieve these aims, according to the report, is to create "adequate employment" defined as "more remunerative and higher productivity employment." The precise manner in which women could participate in the formulation and implementation of the basic needs strategy, however, was omitted from macro-discussions. But the report recognized the contribution of women in providing the essentials of life, and briefly deliberated on the significance of full utilization of women's labor in an economy.

Redefining Women's Work

If the official definition of labor force were to be employed using conventional economic indicators, a world profile of women reveals one-half of the world population and one-third of the official labor force. On the other hand, if a total range of women's actual

The author is an Indian social scientist.

economic activities were to be taken into account, a different picture of social reality would begin to emerge. For example, using simplified assumptions Table 1 presents the world distribution of work-hours giving estimated totals by sex and by market and non-market activities.

TABLE 1: WORLD DISTRIBUTION OF WORK-HOURS BY SEX AND COVERAGE IN THE LABOR FORCE
(Percentage Distribution)

	Market	Non-Market	Total
Included in labor force			
Male	66	10	44
Female	34	28	32
Not included in labor force			
Male	--	--	--
Female	--	62	24
Total	100	100	100

Source: ILO, Womanpower (Geneva, 1975). The estimates give only order of magnitudes for illustrative purposes.

Table 1 illustrates what has been found in time budget studies and common sense observations in current literature on the work of women: that across geographical regions, women work longer hours than men in market and non-market activities--in industrialized countries and the urban sector of developing countries, and more obviously in the rural areas of Asia, Africa and Latin America. It is the nature and type of their work and the global performance of work-hours which raise fundamental economic and social issues. These issues are related to the stage of technological development of an economy as well as the existing division of labor between men and women in society.

Access to Scientific and Technological Knowledge

During the last decade there has been a veritable educational explosion in the developing countries. While literacy remains a formidable barrier to improving the status of women in developing countries, it should be noted that there is an increasing number of girls enrolling in schools everywhere. At the same time, more girls continue to drop out of schools than boys at all levels. The important point, however, is that even where girls manage to cross the first hurdles of primary, secondary and higher level school, their access to scientific and technical jobs encounters intangible barriers. In fact, several studies have emphasized that there is an inherent bias in the existing education structure of many countries (including developed countries) which pre-selects women into Arts and Humanities and away from scientific and technological subjects.

An ILO report pointed out that in most developing countries few girls are enrolled in technical and vocational education (those who are enrolled learn sewing, dressmaking, housecrafts, child-care and embroidery), and few girls are to be found in vocational training outside the school system. "There is sometimes a failure to distinguish clearly between home economics and vocational training outside the school system...although measures are now being taken to bring girls into agricultural schools, colleges and into extension work and services. Some governments (e.g. Egypt, Lebanon, Chile) are making special efforts to encourage the training of girls for some modern occupations such as laboratory technicians and industrial designers and to encourage their subsequent employment."

The principle is generally conceded that women and men should have the right on the same terms to receive education and training for highly qualified jobs and should enjoy equality of opportunity and treatment for career advancement. However, international data (scanty though it is) indicates that, with the exception of some of the Eastern European countries and the USSR, the proportion of women in most countries in "scientific professions" is low. Within these professions women are employed in research rather than in production and management, in specialist and advisory posts rather than in positions of authority, and in the public rather than the private sector.

Outside the formal schooling system and in the agricultural extension programs, projects and training schemes, the inequalities of access of women to learning continue. On this point, the existing information is unequivocal. As Ester Boserup and C. Liljencrantz noted, "In nearly all countries, agricultural training at low, middle and high levels is given to men only. This produces exclusively male instructors--instructors who, in turn, address themselves to the male farmers, overlooking women, even in cases where the wives, daughters and hired female labor are doing the work." The reasons for this neglect seem to lie in attitudes and beliefs that agriculture with female labor is backward, and that female labor should, if possible, be replaced by male labor when agriculture is "modernized." Where women account for a large share of the labor force in agriculture, the failure to teach modern farming methods to women results in adverse effects on agricultural productivity and rural incomes.

Impact of Technological Change on Women's Employment

Since the choice of technologies in developing countries became a subject of debate, a few recent studies, particularly in Africa, have focused on rural activities of women and their relationship to basic technologies. The conclusion of these studies concern three basic issues.

1. Mechanization in agriculture. Several papers from developing countries have pointed out that mechanization in agriculture is found mainly in men's work, while women's work both on and off the farm (including household tasks) has remained predominantly manual. It would appear that certain technological choices are not only labor-specific in that they might use or dispense with units of labor, but that they were female-labor-specific in that they absorb male labor and at the same time disemploy female labor.

This generalization appears to apply to many agricultural tasks such as weeding, harvesting and carrying operations, to food processing, and to a wide range of non-farm activities. For example, women's jobs and incomes from home-brewed traditional beer in some African countries are threatened by the introduction of large-scale breweries; in Indonesia, following the introduction of rice mills in Java, 7 million work-hours of women were lost, depriving them of a significant source of income (see p. 99). Similarly, in a study in Jammu and Kashmir (India) it was shown that with the introduction of machines to spin yarns, the livelihood of 20,000 women was seriously affected.

2. Division of labor. While the relationships of women to production and distribution in the traditional sectors remain significant and relevant, they seem to have limited access to modern technological inputs at all levels. Thus the output of their productive labor has either remained constant or has decreased, in contrast to that of men who have access to modern methods. The direct result of this unequal access between men and women is that work input of women increases proportionately in various agricultural tasks without giving them any control of their output. What emerges from this situation in many countries is that women work longer hours in almost all rural activities with the aid of only their muscle power. Table 2 provides a breakdown of activity between men and women in percentage of total work-hours in rural Africa.

The unequal division of the burden of daily work appears to be a common feature not only of the African continent but also of Asia and Latin America. For example, a comparative study of Nepal and Indonesia (1972-1973) by Devaki Jain points to the same conclusion: in rural areas of both countries women work longer hours (the differentials vary from 6 to 16 additional hours) than men in all age groups. In many societies, age over youth and male over female predominate in taking decisions on distribution of work. What appears to be a general feature of developing countries is that unequal division of labor on the farm is further reinforced by unequal division of labor inside the household.

3. Basic technologies. After devoting attention to the energy-consuming and frequently under-productive work of women in producing

TABLE 2: DIVISION OF LABOR BETWEEN MEN AND WOMEN: RURAL AFRICA

(percentage of total labor in hours)

Activity	Men	Women
Cuts down the forest: stakes out the fields	95	5
Turns the soil	70	30
Plants the seeds and cuttings	50	50
Hoes and weeds	30	70
Harvests	40	60
Transports crops home from the fields	20	80
Stores the crops	20	80
Processes the food crops	10	90
Brewing	10	90
Markets the excess (including transport to market)	40	60
Trims the tree crops	90	10
Carries the water and fuel	10	90
Cares for the domestic animals and cleans the stables	50	50
Hunts	90	10
Feeds and cares for the young, the men and the aged	5	95

Source: ILO, "A Research Note, Technology and Rural Women," p. 2.

and processing staple foods, hoeing and weeding, in providing fuel and water, a large number of studies have come forward to propose technological solutions. It has been suggested that there are considerable advantages in selecting and maintaining simpler devices and equipment for the use of rural women. Several new tools and devices have been minutely examined and tested and these include thin-walled cement tanks, simple hand-pumps, mud-brick stoves and simply better containers for food. Furthermore, harnessing solar energy, wind power and biogas rather than commercial sources of energy has been considered more desirable in the rural areas of developing countries. The essence of this sequence of thought is that rural women have been simply bypassed by the whole process of industrialization of which modern and imported technologies are an important part.

It has been argued that the introduction of such "basic needs technologies" would rule out *ipso facto* the products produced by imported technologies, raise the incomes of the rural women and the productivity of the resources employed, and simultaneously increase the quantity of resources at their disposal. By adopting the solution involving the use of basic technologies, it has been stated that rural women will not only increase their productive capacity but could be helped to help themselves to produce goods and services for minimum needs.

The Modern Sector

Turning to the modern sector, the profile of women workers does not change fundamentally. There too, the introduction of mechanization has produced somewhat similar results. Studies and reports written a decade ago and those published recently point in the same direction: technological progress has the dual effect of widening women's employment opportunities and at the same time pushing them into less skilled and less mechanized occupations. This was recognized by the ILO Panel of Consultants on the Problem of Women Workers as early as 1957. That Panel underlined the positive features of technological developments which reduced the physical effort in a great many jobs, but also noted that wherever employment opportunities for all workers were in short supply, women workers were more likely to suffer the adverse consequences in the transitional period.

In 1967 when, at the request of the UN Commission on the Status of Women, the ILO undertook a preliminary survey to analyze the impact of scientific and technological progress on the employment and conditions of work of women in selected industries, the conclusions were again similar. The analysis of various industries such as metal trades, textiles, clothing, leather and footwear, food and drink and printing and allied trades indicated that there is a consistent pattern in the employment of women. A common thread that runs through each of the industries concerned the introduction of new machinery or equipment: it tended to displace women workers from previously held jobs to low productivity and low wage occupations. To take an example from the textile industry, which is a very large employer of women in many countries, an ILO report found that when a new machine is installed, the tendency on the whole was to "substitute male workers for women workers and to keep women workers on the older and non-automatic machinery." More recent investigation confirms this view. It appears that even in newer industries such as electronics, also a large employer of women in several countries including Norway and Singapore, the dynamics of technical change continually displace women into low-skill occupations.

Based on comparative analysis of many countries on the employment of women in postal and telecommunication services, an ILO report states that rationalization measures made possible by the introduction of new technical equipment often entail the abolition of temporary or part-time posts. Automation in telecommunications does away with operators' jobs; computers eliminate much clerical or bookkeeping work. "Such posts are frequently occupied by women; it is the female staff who are the most affected by the adoption of new techniques... ."

While there is no empirical evidence on measuring the actual technological gap between men and women's jobs, it appears that through various stages of the introduction of advanced or sophisticated technology, the wage differential (between men and women) also widens proportionately. Various reasons have been put forward for this phenomenon. Women workers generally have skill qualifications lower than men, from which it is concluded that women are not able to carry out highly complex and technical tasks. In a reply to a UN questionnaire, it was suggested that women are not in a position to take up work in the heavy industries "involving changes in science and technology, as they are not as yet physically and psychologically equipped for such work...mainly because of the lack of facilities for scientific training and research. But being deprived of such additional technological knowledge equally results in widening the skill and wage gap between men and women."

Future Directions

Three sets of problems have been alluded to above. First, the unequal access of women to the formal education and training, especially in scientific and technical skills in the modern sector, reinforced by the omission to incorporate women in agricultural training programs and projects. Second, some evidence has been examined from the multi-dimensional activities of rural women, especially in food production, which indicates that women continue to "manage" the subsistence economy with traditional techniques (new technology frequently aiding men's work). Finally, it has been shown from examples of some industries--modern and traditional--that the introduction of new techniques, in a shifting occupational hierarchy, continues to displace women or shift them toward lower skill, lower productivity jobs. This process deprives them of the opportunities of upgrading their skills and acquiring technological know-how. The most significant feature that emerges from the above discussion is the profile of inequality of women workers in relation to technical training, inputs and know-how.

Technology plays a decisive role in the process of development. Discussion of technology issues at the international level has been an area of controversy and there are different approaches and solutions. At the national level, the majority of developing countries continue to make technological choices and take decisions which seriously affect their internal division of labor between males and females. Both in the transfer from abroad and the development of national "technological capabilities" to take national decisions in the national interest, there are "external and internal constraints" on the transfer, choice and utilization of technologies.

Turning to the national interest, there appear to be other internalized constraints which play a decisive role in the existing division of labor within an economy and within the household. These are related to modes of production and models of industrialization. These "obstacles"--complex packages of economic and social factors--seem to create and perpetuate "technological dependence" of women in relation to scientific initiative. The cost in untapped human resources to the economy and society may well adversely affect productivity and employment. Some of the current problems in processes of development may have some direct relation to the fact that inadequate attention has been paid to the role of women in technology.

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Appropriate Technology for Rural African Women

Marilyn Carr

[Women in Africa perform mundane and oftentimes back-breaking tasks that could be made much more productive and easier through the adoption of intermediate technology. The following article discusses some of the more promising technological possibilities along with the drawbacks and problems of adaptation, acceptance, and sociological effects.]

The Work of Rural African Women

A myriad of tasks. If intermediate technology holds out the promise of a release from unproductive back-breaking labor, of increased agricultural yields and a slowing in the rate of rural-urban migration, then there can be little doubt that those who stand to gain most from such changes are the rural women, who are the drawers of water, the hewers of wood, the food producers and often the overall providers for the families of Africa. In most of rural Africa, the women do most of the seeding and harvesting and sometimes do the clearing, preparation of the fields and planting. They fetch water, at some seasons 2 or 3 times daily, and may walk 2 kilometers or more each way. They collect and carry wood home. In addition, they look after children and old people, clean, wash, cook and preserve food for the family, and frequently help with the storing and marketing of the produce on the farm. In all, these tasks can amount to as much as 16 hours a day at some times of the year. Despite this, they are still often obliged to find at least some time during the day to spend on soap making or some other activity which can supplement their income in order to pay school fees or purchase items such as sugar and salt. They may also participate fully in community projects: in Lesotho, for

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example, women are estimated to build ninety percent of the roads, and in Kenya they are responsible for about eighty percent of all "self-help" labor.

Evidence shows that in many areas life for the rural woman has been getting harder over recent years. Worsening drought conditions in many African countries mean that women have to walk greater distances to collect water; in Ethiopia, the women spent 3 hours or more on a single journey to collect water in 75 percent of the households under survey. In a number of countries, the land area under forest or woodland savanna has fallen drastically during the last two decades as more and more trees have been cut without being replaced. This means that the women have to walk further and further distances to collect firewood. As soil on rainfed fields becomes depleted through overuse, women have to cultivate larger areas of land to produce enough food to keep their families at subsistence level.

In addition, as the rate of rural-urban migration increases with the possibilities of high wages and modern amenities in the cities, rural women are often faced with the added burden of having to manage and operate their entire farm and household without any help at all from their husbands or eldest children who have left the women behind in their move to town. The 1969 Kenya census indicated that one third of rural households are headed by women; estimates for Lesotho are even higher. A survey in Mali showed that 16 percent of families depend soley on a woman, and a study among Yoruba families in Nigeria showed that one fifth of women received no support from their husbands.

In situations where women are having to spend more and more time in performing their traditional tasks and are also given additional tasks as their men are drawn away into the modern sector in the towns, it is not surprising that agricultural productivity in the subsistence sector declines. The women also have less time left to engage in supplementary income-generating and self-help activities, so family members left in the rural areas have fewer consumer goods.

The forgotten workers. The main problem in all of this is that the economic contribution of the women to the household, the community and the nation as a whole is always undervalued and quite often overlooked altogether. For example, the delivery of water and fuel to the house (whether by pipes, van or cart) is a service which has to be paid for in the towns. It is also a service which obeys the normal laws of supply and demand and becomes more expensive if the commodity becomes scarcer, greater distances have to be travelled to collect it, and more time spent in acquiring it. For instance, the increasing shortage of firewood in the Sahelian Zone has caused prices to rise to such an extent that many families in towns and cities such as Niamey, Niger, spend up to 20 percent of their income on wood. A common saying in this part of Africa is that "Il coute aussi cher de chauffeur la marmite que la remplir." (It costs as much to heat the pot as to fill it.)

Thus, when put in terms of cost, labor has its value; and where a worsening situation can be easily defined in terms of cost it becomes a subject of immediate concern. In the rural areas, however, it is the women who perform the service of bringing water and fuel to the home. There is no question of payment involved in this. In fact, it is not usually even regarded as "work," but just a part of the women's household tasks. When water and fuel become scarcer, as they have been doing in many African countries, the women have to walk further distances and spend more time on these activities. But just as the original burden was overlooked, so is the additional one.

Water and fuel collection, as well as agricultural work done by family members, is not recorded as "work" by statisticians; and when statistics do not show women working, planners do not plan for women to work. But most families in the rural areas would starve to death if the women did not work for much of the day in the fields to grow the food to feed them. It seems inconceivable that a contribution of this nature could be overlooked, and yet this has happened. The modern tools and techniques, the fertilizers and the credit have been steered predominantly into plantation agriculture or large irrigation schemes, while the small farmers who are predominantly women have been left to struggle without the new techniques and training which are needed to raise yields. And when attempts have been made to increase productivity in the subsistence sector, stereotyped ideas about the sex of the farmer have interfered with positive results. In 1974, for instance, Liberia decided to try to encourage wet-rice cultivation and brought to the country a team of Taiwanese farmers. To assure attendance at the demonstration planting, the government offered wages to the observers. Many unemployed men participated in the experiment, while the women continued their work in the fields.

Failure to study the division of labor between the sexes can also have far-reaching effects in the "modern" agricultural sector. Cash crops usually become the responsibility of the men when the element of money has been introduced, but it is often the women who do most of the work on these farms. Thus, in one West African country, although extension workers had shown the men the correct depth to dig holes for the plants, coffee continued to die due to bent tap-roots because it was the women who were doing the digging. The same sort of thing happens when it comes to the weeding, harvesting, storing and processing of crops. Again, these tedious and time consuming tasks, which are almost totally the responsibility of the women, are considered as household duties rather than "work." When tractors or improved animal-drawn equipment are introduced, the men usually take over the task of land preparation from the women. One wonders, however, how much thought was given to who would weed and harvest the extra acreages of land and thresh and winnow the extra yields, and to how this would be done. Very little progress has been made in introducing equipment to allow these tasks to be performed more quickly and efficiently.

When new improved technologies to help with these tasks have been developed, it is usually men who have planned and introduced them without understanding the likely impact of the innovation. The following kinds of things can happen as a result. Schemes to introduce hand-operated weeders have failed, for example, because for these to be efficient crops must be planted in straight rows. However, it is the men who have been taught this technique, while it is usually the women who do the actual planting. Schemes to introduce scythes to speed up the harvesting of crops have also had problems. Women traditionally perform this task using a small pen-knife to cut each stalk of the crop one by one. The scythes cut further down the stalk, and this involves a much heavier load to be carried from the farm to the home. Plans to introduce scythes would have more success if the trouble was taken to find out what implications are involved, and whether a redesign of the implement or complementary measures such as introducing transport facilities might be feasible. In the meantime, the women have not been consulted, and they refuse to accept and use scythes.

Similar examples can be found with new technologies developed to help with tasks such as the grinding of cereals and shelling of maize. Pedal-operated grinding machines and hand-held maize shellers may be appropriate in terms of low cost, ease of maintenance and repair and use of local materials. They may not, however, be at all appropriate in terms of the needs of the people who traditionally perform the tasks for which they are supposed to substitute. In many African societies, it is considered improper for a woman to sit astride, and where this is the case, women will not use a pedal-drive grinding mill, however useful it might be to them. Of course, men may take over the operation of such a mill, but under the circumstances hand-operated grinding mills which the women could operate would seem more appropriate.

An innovation with a somewhat different handicap is that of the hand-held maize sheller. Several types of these have been designed--all by men who, unlike rural African women, have not spent even a day shelling maize with their bare hands. Since women find they can shell the maize much more quickly with their own hands than with a sheller they see no point in buying one of these, even at a low (subsidized) cost, so the money and time which went into the development and production of such devices is wasted.

One area in which women greatly need help is in the use of new water technologies (i.e. the installation of wells, pipes, and pumps --as needed) to ease the burden of the daily carrying of water for drinking, cooking, and washing. Women also need to be given training in maintenance and repair of pumps and water systems. At present, if training is given at all it is given to men, who may see no great urgency in looking after water supply equipment when women are always available to collect water from further afield if the pump or piping system breaks down. This might explain why so many of the pumps installed in Third World villages are now out of order.

Women also need help in measures which can relieve them of the burden of walking long distances each day in search of firewood. Reforestation programs might have more success if they were aimed at women rather than men. It may make little difference to the men whether the source of cooking fuel is 3 meters or 3 miles away. Similarly, attempts to gain acceptance of the use of solar energy and methane gas for cooking might have more success if the trouble was taken to explain such technologies to the women as well as the men. Food production, storage and processing are also areas in which women need help. A range of improved technologies is available for performing all these tasks more efficiently, but a variety of obstacles often stand between these and the rural women.

If women had access to equipment to help with the shelling of maize and groundnuts, the grinding of cereals and the pressing of oil from palm fruits, they could perform these tasks more quickly, with less effort and more efficiently. Usually, however, they have no money and no access to credit, and cannot purchase such equipment themselves; oil-presses in West Africa, and corn and rice mills throughout Africa are nearly always owned and operated by men. With access to such labor saving devices and with training in their use, women would have more time to spend on income-generating activities. Here too, however, a change of emphasis is needed. When training is available to women, it is usually in the supposedly "female" areas of sewing and cooking. Training in improved methods of making pottery, bricks and household and farm utensils is nearly always restricted to men, even though these are areas in which rural women are traditionally engaged. The introduction of labor-saving equipment would also give women more time to spend on improving their homes and participating in self-help activities. The combination of labor saving devices and a diversion of time into profitable income-generating activities could also give the women more money to spend on these activities --and extra money to spend on more labor-saving devices and equipment to help with expansion of small-scale businesses. This process can be seen as self-reinforcing, resulting in a vast improvement in living conditions in the rural areas.

While the fact that women perform most of the work in the rural areas continues to be ignored, there will be little headway made in increasing food yields and generally improving the quality of life in rural areas. The burden of this falls mainly on the women, and they cannot and should not be expected to make progress without the benefit of access to better equipment, training and credit facilities. The needs of the women and the community as a whole would be better met if women were given the means to purchase their own equipment on a cooperative basis, and if they were also taught how to operate and maintain the equipment themselves. The dissemination of appropriate technologies to rural women, combined with the fostering of rural industries to provide non-farm employment for both men and women, could go a long way towards improving employment opportunities in the cities of Africa. Some examples of technology that could contribute in this way are described below.

How Appropriate Technology Can Help Women

African women, when consulted in training workshops, conferences and meetings, have identified four areas in which appropriate technologies could make an especially significant difference in the lives of the rural women:

(a) Provision of water supplies in rural areas;

(b) Introduction of light transport facilities for the portage of water, wood, farm produce and other loads;

(c) Adoption of efficient agricultural tools; and

(d) Introduction of grinding mills and other crop processing equipment.

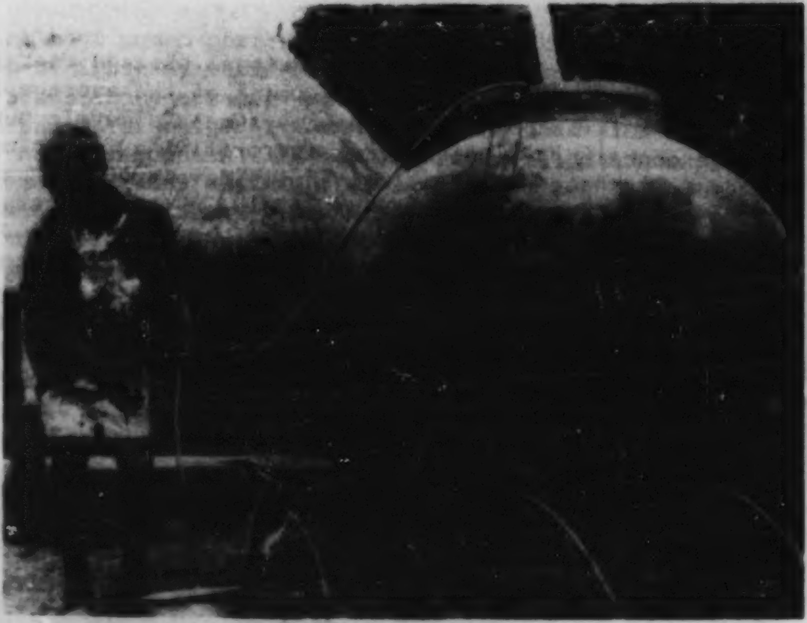
Water supplies. There is little doubt that the carrying of water imposes the most strenuous physical burden of all the tasks performed by African women. It is estimated that, on the average, one sixth of all the energy expended by the women in the rural areas is used in carrying water. Individual studies show that in many areas, women may spend as long as four hours or more on a single journey to collect water.

One answer to this problem is to provide a catchment for rain water nearer to the house. Catchment from roofs is possible and, even in areas of fairly low rainfall, it is a practical proposition. There is, of course, a problem of cost. Contrary to popular belief, it is not essential to invest in a galvanized tin roof for the purpose of water collection--a thatched roof covered with polythene can serve just as well. It is also possible to use local materials like bamboo to construct guttering. The real cost problem occurs with the storage of the water once it has been collected. Conventional storage containers, usually made out of metal, are beyond the means of the average family or small village. Work is being done, however, on the development of cheaper storage containers. One of the more promising technologies is a thin-walled cement jar which was originally developed in Thailand and which is now in use in almost every household in that country. The cost of the cement used in making a jar with a capacity of 3000 litres is about US $10; by comparison, the conventional galvanized iron container of the same size costs US $100. This new technology has now been introduced in Africa through the Village Technology Unit in Kenya and is already gaining popularity in the rural areas because it is easy to construct, it is low in cost, and it meets a well-recognized need.

Water Storage

Thin wall cement jars can be built very cheaply on a mold made from a stuffed bag.

In many parts of Africa there are streams providing an ample supply of water in the valleys but villages are located in the hills, high above the water sources, so that the women have the back-breaking task of climbing up and down difficult terrain to collect water. This problem can be overcome with a hydraulic ram pump, which needs only the pressure of the stream flowing through it to lift water through a piping



These can be used for storing rainwater collected from roofs.

system to a higher elevation. Commercially made pumps are, of course, expensive. Prices range from US $300 to US $2,600 depending on pumping capacity. However, advances have been made in developing an adequate pump which can be made locally in areas where iron and pipe fittings are available at a fraction of the cost of the commercial imported varieties. Such a pump was constructed at the Village Technology Unit in Nairobi and has been operating successfully for the last two years, showing no noticeable difference in performance from the commercial pump which stands next to it. The pump requires a steady reliable supply of water with a flow of more than 5 liters per minute at the source; from a one meter head, it can pump water to a height of about 150 meters. It has only two moving parts (the valves), which are cheap and easy to maintain, and once installed it has no running costs.

There is a whole variety of types of water-lifting devices other than the ram pump which are either hand-operated or use the wind or some other no-cost energy source instead of expensive and scarce fuel. Besides saving the energy of women involved in lifting water out of wells with buckets, the use of a pump also allows the well to be covered and thus keeps drinking water free from surface pollution. Many of the hand-operated pumps cost between US $20 and US $70 and are within the financial means of a small community. An effective windmill for pumping is likely to cost between US $70 and US $500 and is therefore, better suited to a larger community.

Transport facilities. Perhaps the most common sight in Africa is that of women carrying loads of water, firewood or other burdens on their heads or backs. The medical consequences of a lifetime of this activity have yet to be adequately recorded, but anyone who cares to ask can learn that this is a burden that the rural woman is anxious to shed.

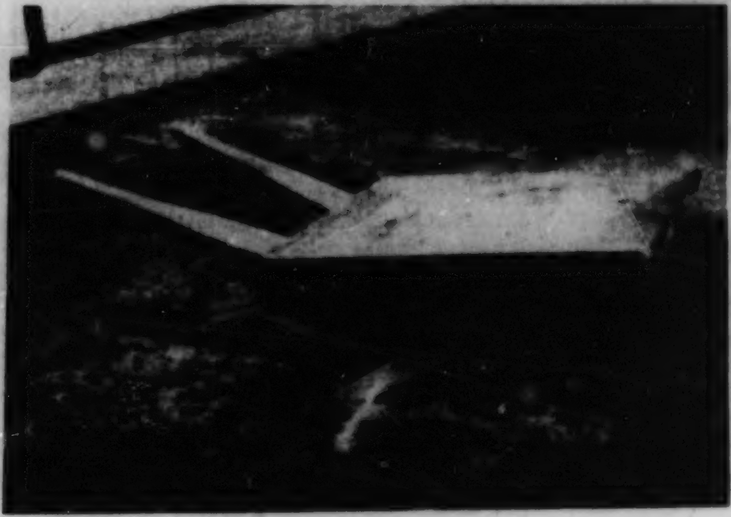
This is far from being an easy problem to solve. The most probable alternative to carrying water or wood on the head or back is to push it on a wheelbarrow or handcart. With this in mind, several types of low-cost carts have been developed in Kenya, Tanzania, Zambia and other African countries. One example is the simple water cart developed in Machakos District in Kenya. Another is the inexpensive wooden wheelbarrow made at the Tanzanian Agricultural Machinery Testing Unit (TAMTU) in Arusha. In certain cases, these can help women by allowing them to carry more wood or water on each journey and thus fewer journeys are needed with less effort.

Often, however, women find the use of carts or wheelbarrows even more strenuous than carrying the load in the traditional manner since their muscles are unused to the physical strain of pushing. In any case, the terrain over which they must carry their load may be too rugged to allow the use of simple wheeled equipment. The obvious solution, therefore, is to bring water and fuel nearer to the homestead, rather than helping the women to carry these over long distances. The new water technologies which can help women in this respect have already been discussed. Similar developments are taking place with respect to fuel. Planting village woodlots is a feasible solution in some areas. In others, the best way out is to reduce the amounts of fuel needed.

Transport Facilities

The Machakos Water Cart from Kenya (right)

The TAMTU Wheelbarrow from Tanzania (below)



Fuel conservation. One popular approach to eliminating the need for firewood for cooking is the introduction of the use of solar heat for this purpose. To date, two types of cooker have been developed which use solar heat. One reflects the heat of the sun onto the bottom of a pot. The other uses the heat of the sun to boil water to produce steam which is then used for cooking.

The solar reflecter cooker works on the principle of using several reflecting surfaces to concentrate light and heat onto one point, the cooking point. Using only the sun's heat, two pints of water can be boiled in half an hour. However, this cooker must be placed facing directly into the sun and has to be constantly adjusted throughout the day as the sun moves. It can also be easily tipped over by children or goats; and only one small pot can be used for the cooking. Perhaps the most serious objection to these cookers is that the main meal of the day is usually cooked in the evening when the sun has gone to rest or lost most of its strength. The solar steam cooker is more expensive and more difficult to construct, but it can more easily be adapted to overcome the disadvantages of the reflective cooker. Since it is designed to use the sun's heat to produce steam for cooking slow-cooking foods such as maize and beans, it works all day in the sun (while the woman is in the fields) to produce a family-size cooked meal in the evening. The cooker does not have to be moved as the sun moves and it is much less likely to be upset or damaged.

Another approach which has been tried is the use of methane gas for cooking. In its simplest form, methane gas can be produced by filling one third of an oil drum with human, animal or vegetable wastes, one third with water and one third air. The drum is then sealed with a bacterial culture and fermentation takes place which produces gas. This is cheap enough, but problems arise in the storing of the gas and in the transfer to the stoves in which it is to be used. Cost-wise, it is more efficient to produce, store and use methane gas in large quantities. This indicates that village women might have to forego their individual kitchens and adjust to a communal cooking place in cases where the alternative of piping gas to each home would add too greatly to costs. Methane gas could perhaps be used in cooking communal meals in rural schools or day-care centers.

At the present time, one of the most feasible ways to reduce the collecting of firewood is to introduce stoves which use wood in a more efficient way. For instance, it is possible to use mud to build a stove on which three pots can be heated at one time and with only half the amount of firewood involved in cooking by the traditional "three stones" method.

Efficient agricultural tools. Most women in Africa till their rainfed fields with short handled hoes. If they had improved hoes, with longer handles, this would eliminate much of the hard work which is involved since less bending is needed. Planting and weeding are other operations which involve stooping and bending. In many areas of Africa, women must perform these arduous tasks, not only on their own land, but also on their husband's fields. There are, however, simple hand-operated seed planters and weeders, many of which can be made locally for under US $20. One woman can plant about half an acre of land in a day with a seed-planter, and can weed up to 2 acres a day with a simple weeder.

Harvesting of crops, usually done completely or partially by women, is mainly accomplished by means of a small knife cutting the stems of the crop one by one. Scythes and sickles perform the job more efficiently, but these are often too heavy to be used by women, or are otherwise unsuited to their needs; they could be better adapted. There are also several types of small power reapers which can be and are easily used by women. These reapers consist of a small cutting blade which is operated off a very small diesel engine; the engine is carried on the back in knapsack fashion. One woman can harvest a whole acre in 25 to 30 hours using one of these devices (it takes days for an acre to be harvested in the traditional way). Developments have also been made in hand-operated, pedal-operated and animal-powered threshing and winnowing machines which take much of the effort out of these tasks and result in a considerable saving of time.

Grinding mills. Of all the tasks which rural women undertake daily, the one which is mentioned most frequently as being the chore they seek to be rid of is that of grinding maize, millet, sorghum, rice or other staple crops. It usually takes 1 to 2 hours to produce enough flour to provide an evening meal for the family, coming at the end of a long, exhausting working day.

One solution to this problem is a small community mill which is cheap, reasonably efficient in speed and fineness of flour, easy to operate and easy to maintain and repair. Several hand-operated grinding mills which can cope with an output of about 35 to 40 lbs. of flour per hour are currently available. Such mills enable a woman to grind enough flour for the week in about 30 minutes, and can easily meet the needs of small communities without being overused. The price of such mills--about US $100 each--is also within the means of a small community. Developments are also taking place in pedal-operated and animal-powered grinding mills. In cases where maize does not need to be ground into flour but merely crushed, as in many parts of East Africa, there are also small hand-operated machines available to take the effort out of the operation.

There are many other simple, low-cost machines which can help women with processing of all types of crops. Hand-operated oil-presses can help with the extraction of oil palm fruit, coconuts, simsim, groundnuts and castor beans. There is also equipment available to take the hard work out of cracking palm nuts. A simple piece of equipment made from wood and chicken mesh can greatly cut down the time spent on decorticating groundnuts. Machines are also available to help with the shelling of maize, hulling and polishing of rice, crushing of sugar cane, grating of cassava and many other tasks in which rural women are constantly engaged.

[Edited extract from Chapters 2 and 3 of Appropriate Technologies for African Women, report published by the United Nations, 1978 (ECA/SDD/ATRCW/VTGEN/78).]

Java, Indonesia: The Introduction of Rice Processing Technology

Melinda L. Cain

[This article summarizes some of the major social and economic impacts stemming from the Government of Indonesia's attempt to modernize agriculture. In particular, it examines the impact of several items of new technology on the traditional women rice harvesters and processors.]

Traditionally, Javanese rice farmers allowed anyone who wished to participate in their rice harvest to do so. The harvesters were mostly women from within the local village and from neighboring villages. The women used an *ani-ani* (small finger knife) for harvesting. The *ani-ani* was suitable for cutting local varieties that matured at different times and had varying stalk lengths because stalks were cut individually. The harvesters carried the rice in sheaves, bound in the field, on shoulder poles to the owner's house. This method of harvesting required large numbers of people, and many thousands of landless families were involved throughout the island of Java. In fact, one farm survey showed as many as 500 persons employed per hectare. The harvester's pay was a share of the crop he had cut, with a ratio of about seven to ten for the owner and one for each harvester. The division was made by bundles and not by weight.

The *Tebasan* Harvesting System and the Use of Sickles and Scales

Traditional methods of rice harvesting in Java have changed significantly, partly because of the increased population pressures on land. Individual farm sizes have become smaller as farms have been subdivided from generation to generation, and it has become more difficult for

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farmers to run a profitable business. The population increase also has meant that a larger number of landless laborers are looking for harvesting work. As the amount received by each harvester has grown smaller, they have tried to obtain larger shares than custom dictates. Furthermore, since the farmers customarily have felt a social obligation to let all the harvesters participate, farmers have found their share of the harvest diminishing.

One way of improving the farmers' share has been to limit the number of harvesters. This can be done by the adoption of the *tebasan* system that enables the farmer to sell his crop to a middleman *(penebas)* before harvest. This makes it possible for farmers to limit the number of harvesters and avoid the problems of supervising the harvest and dividing the shares without failing in their social obligations as interpreted in the community.

Because the *penebas* is recognized as a trader, his right to a profit is accepted. Individual harvesters may benefit from this system, especially when the *penebas* can control the number of participants, thereby ensuring larger returns for each harvester. Based on village surveys, some rice always has been purchased by the *tebasan* method. However, the system has become more important with the use of HYV (high yielding varieties of rice), because there are now two harvesting seasons, and thus, more rice to harvest.

A comparison of costs of harvesting with the *penebas* were estimated from a sample of village surveys. Using the *ani-ani* rice knife and the traditional system, the estimated harvesting costs were about $30.00 per hectare. Comparing those costs with about $15.00 per hectare that it costs the *penebas* to harvest, it is evident that the harvest costs can be reduced about 50% by using the *tebasan* system.

Tebasan and the introduction of HYVs have caused an important technical change in the method of harvesting rice: the use of the sickle. While the *ani-ani* is more suitable for cutting traditional varieties of rice, as noted above, the sickle is preferable for cutting the more uniform HYV. When the sickle is used, the rice is threshed in the field, then carried in sacks to the *penebas's* house, where harvesters are paid in cash according to the weight, not according to bundles; when the *penebas* began to use sickles, scales became necessary to weigh the shares for the harvesters. Harvesters must provide their own sickles, threshing mats, and sacks to carry the rice. With sickles, only about 75 person-days are required to harvest one hectare, while with the *ani-ani*, 200 or more person-days may be needed.

The Introduction of Rice Hullers

Mechanized rice hullers were introduced in 1970, due to governmental initiative, and their diffusion occurred very rapidly thereafter, as illustrated by Table 1. By 1978, only about 10 percent of the harvest was being hand-pounded, mostly for family consumption.

Table 1. Number of Sample Farmers Processing Rice with Hullers, and Numbers of Hullers in Sample Villages, 1970 and 1973 (*)

	No. of Farmers in Sample	No. of Farmers Processing Rice with Hullers		Number of Hullers in the Village	
		1970	1973	1970	1971
West Java					
Kab. Serang					
Sentul	27	0	0	0	0
Warungjaud	24	0	17	0	*
Kab. Cianjur					
Jati	29	15	29	3	5
Gekbrong	27	0	0	0	0
Central Java					
Kab. Banyumas					
Kebanggan	30	0	29	0	1
Sukaraja Lor	30	0	22	0	*
Kab. Kebumen					
Bulus Pesantren	30	0	27	0	*
Patemon	30	2	25	0	1
East Java					
Kab. Ngawi					
Geneng	29	0	26	0	3
Gemarang	30	n.a.	21	0	2
Kab. Jember					
Sukosari	30	0	26	0	8
Tanggulwetan	28	8	27	n.a.	8

*Farmers from these villages used hullers in neighboring villages.
Source: Collier, "Choice of Technique in Rice Milling: A Comment." Bulletin of Indonesian Economic Studies, Vol. X(1), March 1974. Reprinted by permission.

A Japanese model of the rice huller that uses rubber rollers has been the most common in Indonesia. Rice must be processed through the machine four to eight times. It is first poured into the top of the huller; the hulls and (bran) excess material then travel through a pipe and are discarded outside the building. The hulled rice is then run through the polisher three or four times.

Choice of technology and economic aspects. C. Peter Timmer has analyzed the choice of the rice hulling technology in Indonesia. Four alternative milling/storage/drying facilities were considered by USAID/Jakarta and the Indonesian government in order to "modernize" the rice marketing sector, the most capital-intensive of which required $65,000 investment per worker and the most labor-intensive required only $700.

The Indonesian government chose the least capital-intensive mechanical technology alternative because it was economically preferable. Loans to buy hullers were made available at 1 percent per month interest, whereas regular village credit runs about 5 to 10 percent per month. Thus the machines were well subsidized, and available to those who could afford them. A study by William L. Collier estimates the average investment costs of a hulling center to be $3,111 for machinery, buildings, and land. Such a hulling center would have an average capacity of .58 tons per hour. This figure is based on the combined use of old and new equipment. Timmer estimates $8,049 as the initial cost of a hulling center with a capacity of .42 tons per hour. [Note: price levels, exchange rates and interest rates have shifted over time.]

For a huller I investigated in Pasawahan, the initial cost in 1976 was Rp 2.5 million, about U.S. $4,000. The owner of the huller said that operating costs were low. Both the huller and polisher were diesel-powered, using a crude kerosene fuel that cost Rp 30 per liter (five cents per liter, or twenty cents per gallon). Ten liters would run the huller for five hours and process about one ton of rice. Repair costs so far had been few; the owner pointed out a small part that had recently been replaced for Rp 40,000 ($66). At this particular hulling center or mill, about two tons of rice could be hulled per day. This compared to the hand-pounding of forty kilograms per day by one woman. Two men who operated the huller and polisher could process about 100 kilograms of rice in twenty minutes and were paid Rp 45 for every 100 kilograms.

It was found in one survey of comparative costs that the average cost of hand-pounding was $1.45 per 100 kilograms, while the average cost to the farmer of using a huller was $.54 per 100 kilograms. The by-products of the huller were kept by the miller, while in the traditional harvest women were able to keep the by-products to use as animal feed.

Impact of the technology in Java. Since 1970 the mill has taken over work traditionally done by women. Two examples cited by Collier illustrate these changes: "A former rice trader, now turned mill owner, stated that he used to employ eight women to hand pound his rice. Four women working five hours could hand pound 100 kilograms; so this rice trader could buy 200 kilograms per day. The women's wages were 10 percent of the rice they provided, which amounted to just under two liters of milled rice per day. Over the harvest season these eight women earned perhaps sixty liters of milled rice each, or enough to feed themselves for four months. In Kendal, Central Java, a farmer said that in the past there were more than 100 women 'hand-pounder' laborers in his village. But now they have no work."

Estimates of jobs lost ranged as high as 1.2 million in Java alone as a result of the introduction of the new technology. Collier estimated that the loss to laborers in earnings due to the use of hullers was U.S. $50 million annually in Java, representing 125 million woman days of labor. The rice farmer pays less to the mill for threshing and the process is much quicker, but the women have lost a highly remunerative source of income. The shift from a traditional technology to a more modern one has eliminated one of the more important sources of income for landless villagers.

Thus, although the adoption of the use of HYV, *tebasan*, sickles, scales, and rice hullers has served to increase rice production in Indonesia, it has not helped to solve the problems of unemployment and income distribution in Java. Rather, it appears these problems have been exacerbated. Furthermore, there is little evidence to indicate that the rural unemployed are being taken up by work opportunities in the cities, or have been able to find replacement sources of income in the rural areas.

Concluding Remarks

Indonesia is a land of contrasts. Java and Bali are islands with dense populations that create massive unemployment problems. Other islands are short of labor for production. While the observations made in this study refer specifically to Java, it is important to note the differences within Indonesia and to refrain from generalizing to other islands. This implies that regional variations within a country might well dictate the need for several different policy packages in technology choice within a single country, at least one with 140 million people on various islands. In this case, the policy for modernizing agriculture was applied throughout Indonesia, and as illustrated on Java, this caused some unanticipated negative impacts.

This case also shows, however, that technology by itself does not predetermine the outcome; it is the uses of technology that determine whether it has positive or negative effects. It is, therefore, important to consider who will own the technology and who will benefit from its use. On Java, those with a substantial income were able to afford the new technology. Those who were at the subsistence level, including the great majority of women who pounded rice, were not in a favorable position to purchase the hullers and thereby lost access to one source of income. In contrast, I was told that women in West Sumatra have used the introduction of rice hullers to their advantage. Due to the matriarchical system, women there own the land and make the agricultural decisions. They were able to form cooperative groups with sufficient access to financial resources to buy the hullers, and use them profitably.

Finally, this case describes a common trade-off in development situations: mechanization versus labor utilization. It is difficult to call rice mills a "mistake" because the process is more efficient in terms of input/output, and such efficiency serves the important national goal of increased rice production. Furthermore, hand-pounding of rice is an arduous task, and it is unlikely that the women were sad to see such hard work be replaced. However, if technology is to be introduced that may have implications for labor displacement, a prudent policy consideration would be to provide alternative sources of income, employment and training for those who might be displaced. One way to deal with these consequences is to promote rural industry based on local materials; with some creativity, alternative sources of income can be found.

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New Technologies for Food-Related Activities: An Equity Strategy

Irene Tinker

[Women's contribution to the national economies of many Third World nations has largely been ignored in economic measures. The following article explores some of the reasons for lack of recognition of the "invisible woman" and discusses economic contributions made by women, in Africa, Asia and Latin America. The article focuses on food production.]

There are two biases in contemporary economic development thinking and practice which throw up psychological roadblocks to the inclusion of women as equal partners in development. The first is the continued emphasis on a dichotomy between the modern and the traditional sectors, between the economic activities done for money and those done within a family context, whether in a house, a farm or a handicraft enterprise, or as volunteer work. Statistics collected by many governments still tend to emphasize activities in the modern monetary economy; activities outside those boundaries may not be considered "productive work." The second bias, the stereotypes of appropriate roles for women which many men carry, interrelates with definitions of economic activity. Essentially, in this view, women don't "work," or if they do, they shouldn't.

These two unexamined biases have combined to skew development planning for the poor, men as well as women. This emphasis on statistics for the modern sector has obscured activities in the informal sector. For example, planners for Africa are given data which tell them that only 5 percent of the women work. It is too easy to forget that such a figure applies only to the modern sector and thus to obliterate, for planning purposes, the fact that 60 to 80 percent of the agricultural labor is done by

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women in Africa, or that women dominate the marketing and processing of agricultural produce.

Kathleen Newland in her 1979 book The Sisterhood of Man records how differently different countries define which activities are included in national income accounts. She describes the long work days of Iranian nomad women who, in addition to the care and feeding of the family,

> "...haul water into the camp on their backs. They milk and shear the animals, mostly sheep and goats. They collect such edible plants, berries, roots and fungi as the surroundings afford. They churn butter, make cheese and yogurt, and refine the left-over whey into the daily beverage. They spin the wool and goat hair into thread or press it into felt and make clothes, tent cloths, and carpets for their families' use. From each tent-household of an extended family a woman goes daily to collect firewood from the brush; on the average, she spends half a day at the task, plus another hour at the camp breaking the torn-off branches of thorn-bush into pieces small enough for the cooking fire.
>
> In the national economic accounts of Iran...the only portion of the nomad woman's work that will show up even as subsistence production is her output of woolen textiles and dairy products. If she lived in the Congo instead of Iran, the accountants would also include her food-processing activities in calculating the Gross Domestic Product, but they would omit her production of handcrafted articles. Taiwan's bookkeepers also would leave out handicrafts; they would, however, assign economic value to the woman's water carrying and wood gathering. But in Nigeria, it would be argued that, in rural areas, wood and water are free goods, like air, and so are the human efforts that make them useful." (pp. 129-30)

The inconsistencies involved in the coverage of income accounts are apparent in the United States today. With the rise of two-income families, nearly half of the food consumed in America is eaten outside the home, prepared by paid workers in restaurants. Suddenly the effort to feed the family has been moved from an invisible category to "economic activity." Many of the services to the sick and infirm which were formerly undertaken by compassionate relatives or volunteers, predominantly women, must now be paid for. Money is the measure of status; "non-productive" activities are seen as peripheral and marginal--until they begin to disappear.

Among the poor, every family member who is able must contribute to the family support. Such support becomes even more crucial as poor families are pushed to their margin. Ann Stoler has analyzed women's economic activities in Java in relationship to the family budget, and finds that the women in landless and near landless families earn one-third of the household's total income, a much larger share than is contributed by wives from larger landholding classes. In Mexico, the contribution of women to their families' budgets varies by cultural groups as well as class.

Particularly in Africa, the persistence of sex segregation in both occupation and responsibilities means that in many areas a woman is expected to provide food, clothes, and education for her children and food for her husband from her own separate budget. As men's earnings have increased through cash crops or urban employment, they often feel no obligation to increase their share of child support. Recently a Kenyan woman sued her urban-dwelling husband in District Court for school fees for their son. His defense was that he had provided her with a piece of land; she was responsible for the care and schooling of the children. The judge, however, found for the woman, who had argued that the size of the land made it impossible for her to save enough money for fees; besides, this husband was well-employed.

Because African women provided the bulk of family support, modern industry and plantations were able to siphon off the men without paying them wages sufficient to provide for the entire family. A recent UN report notes that in Lesotho this "functional relationship between the subsistence and the modern sector provides 95 percent of the cash earned there. At any given time, close to 40 percent of the working-age male population resides in South Africa, thereby leaving the villages with a substantial numerical predominance of women. Since the men's earnings are not sufficient, the subsistence output provided by women is necessary for family survival.

The pressures on the family of such migration patterns have clearly contributed to the increased numbers of women-headed households around the world. Economic development which has left women behind in the subsistence economy while pushing men into the modern sectors encourages the disintegration of the family. Today it has been estimated between 25 and 33 percent of households are de facto headed by a woman due to divorce, death, desertion, long term migration, or because she never married. These female-headed households are among the poorest groups in every country. And poor women, whatever their living arrangement, must work to survive. Being invisible to development planners, and being the poorest of the poor, they have as a group been most adversely affected by development.

Women and the World Food Crisis

The three major strategies for meeting the world's food shortages--increased production, greater income-producing activities so people can buy food, and a reduction in postharvest food losses--should be strategies for aiding the rural poor women. Women in Asia and Africa provide between 60 and 80 percent of agricultural labor; in Latin America the average is about 40 percent. Indeed, poor women everywhere work in the fields, though such labor may be denied because of the status implications. Women's participation in processing, preserving, and preparing food is even greater than their participation in production.

Women's responsibilities to help feed their families are becoming harder to fulfill as modernization restricts traditional activities which enabled women to grow or earn food. Greater income-producing activities for women could therefore have a more immediate impact in supplying basic food and health to the poor than similar activities aimed only at men. In order for the food crisis strategies to accomplish their goal of feeding the world, women must not only be included in planning, they must be central to it. Women must be consulted in the selection of new technologies, trained in their use, and given means to control those most related to their spheres of economic activity.

Almost universally, new technologies for food-chain activities have been introduced to men regardless of women's contributions. Rural poor women are more likely to be illiterate, and so presumed unable to alter custom to adopt new technologies. Further, rural credit is scarce enough, and is seldom extended to women because they lack assets for collateral. Land is the major rural asset, and colonial governments generally registered communal land in the man's name. Women's uncertain access to land, credit and education prevents their access to and control of new technologies which might help them out of the poverty, so that they could afford land, credit, and education. This vicious circle has intensified women's dependency on men in rural areas. Further, many of the technologies introduced into agricultural production have had negative effects on poor rural women by removing their opportunities to earn money in the activities where labor is saved.

The greatest impacts of technology in agricultural production have been on cash crops such as bananas, cotton, pineapples, rubber, tea, coffee, sugar cane, peanuts, and sisal. While many of these crops are edible, they are seldom part of the local diet. Cash crops have competed for land and labor with the local food crops. Until recently little research went into improving most food crops. As wheat, corn and rice became exchange commodities in the international market there have been concerted attempts to improve production. The resultant "green revolution" has affected rice and wheat; but other major subsistence crops such as yams and millet or beans and cassava have yet to respond to research efforts. Local market crops and small animal breeding have received little research attention, underscoring again the perceived dichotomy between the modern commercial sector and the traditional sector.

The impact of new technologies varies both by major crop and by farming systems. Ester Boserup in her landmark book on Women's Role in Economic Development finds a relationship between women's status and the need for her labor in subsistence food crops. Thus the introduction of the plow contributed to a loss in women's status historically; similar impacts occurred with the introduction of the sickle in Indonesia, or new crops in the Sudan which lower women's utility and hence their status.

Sub-Saharan Africa. The change in women's status as a result of agricultural modernization can be seen most clearly in Africa. In the traditional societies, women held fairly independent and equitable positions in both the nomadic and settled agricultural communities. Such societies were also characterized by little social stratification. Women did the bulk of farming work among the settled agriculturists. The major impact of new technology, being focused on non-subsistence crops, has been to draw off land and labor from the food crops. Women continue to grow and control food crops, but because this sector has been much less monetized, they must seek money from other activities. The specifics of this impact vary, but some of the leading effects have been:

--men migrate to urban areas or to mines in search of income;
--women work cash crops in addition to subsistence crops;
--women's land is taken away for cash crops;
--new settlements ignore food needs and thus women's productive activities.

The culmination of these trends has been to increase the work of poor women while lowering their status. Women from the growing elite classes, however, have tended to move out of food production.

Cash and subsistence crops. As men migrate to cities, statistics suggest that one-third of farm managers in Africa south of the Sahara are now women, with even higher percentages in some countries: 54 percent in Tanzania and 41 percent in Ghana. Most cash crops in Africa are grown on small holdings. Many women not only work their subsistence crop fields but also contribute their labor to cash crops. This reinforces the inequity and inefficiency of the present practices, according to Louise Fortmann in her study of Tanzanian agriculture.

> "The inefficiency arises from the fact that women...have limited access to...information and land which would allow them to become more productive. This differential access is based...on accepted social norms and customs. Similarly, the heavy work load already imposed on women often prevents them from adopting improved technology that requires additional labor inputs. Thus the present village and household organization of labor limits the potential for increasing production... Because of traditional rules of land tenure relatively few women are able to undertake cash crop production in their own right. Those who work on their husband's cash crops rarely receive a proportionate share of the proceeds." (Dar es Salaam, mimeo, 1978)

Where women get few rewards from the production of cash crops, it is no surprise that whenever there are competing demands between food and cash crops, they work on the food crops. In the Gambia, where women receive the full proceeds from the sale of onions they grow, over 4,000 willingly work on this cash crop.

Plantations. Plantations are less common in Africa than in Asia, but in both continents women have provided them with cheap labor. In Uganda and Kenya, however, this source of income is diminishing on coffee and tea plantations where the introduction of insecticides and fungicides have reduced the need for weeding, by as much as 85 percent in some cases. National governments, eager for foreign exchange, and most agricultural experts have tended to view the use of land for subsistence crops as inefficient. Pressures to grow the more profitable export crops have reduced acreage allotted to food crops, and in some areas have resulted in women losing their traditional rights to grow their crops on communal land. In Upper Volta, for example, a foreign development scheme for swamp rice essentially turned the crop over to men along with the land used for it. In Cameroon, women were forced off the cleared land near a village which is nearly all taken up with coffee and cocoa plantations; the food fields are anywhere from one to ten kilometers from the village.

New settlements. New settlement schemes have often had a deleterious effect on women. In Nigeria, the government provided families with five-hectare plots for the production of soybeans for sale. Corn could be grown for personal consumption, but amounts were limited by the seeds provided. No garden plots were provided, thus depriving women of land to grow food for the family which they had done, with the exception of corn, before joining the resettlement program. Income from the cash crops was given to the men while women received no wages for their labor on these fields.

The Mwea irrigated rice scheme in Kenya did allocate garden plots to the women, but these were small because it was assumed that rice from the irrigated plots would be added to the diet. Women in fact did receive some rice in return for their labor on their husbands' land, but since the men refused to eat rice, women had to sell it and buy traditional food at increasingly high prices. Women on the scheme did not have time, nor land, to raise enough food for their own consumption; they worked longer hours than before but could not provide as much food for their families as they had. In addition, they often had to buy firewood for cooking since fuel was scarce in the resettlement area, and women's time was less. Thus while the total income of the families in the scheme has gone up, and visible wealth in the form of transistor radios and bicycles is in evidence, nutritional levels nonetheless have fallen.

Nutritional levels falling. A recurring theme in these studies of new technology for cash crops is that while cash income may have increased, nutritional levels tend to fall. The primary reason for this seemingly contradictory phenomenon is that this increase in income belongs to the man. In parts of Africa, men may use this money for improving homes, or in throwing "prestige" feasts, or buying transistor radios, instead of for more pressing expenses to meet family needs which had not been their traditional responsibility.

A second major problem in ensuring that increased income is translated into improved nutrition is the marketing system. The fragmented nature of the present marketing system in Africa means that traditional subsistence crops are not widely available. Market crops cannot be shipped any great distance because of the spoilage problems and lack of transport, even when the earners of incomes from cash cropping could afford to buy them. As areas urbanize and markets include a greater variety of food, cash becomes more important, while in smaller markets it is still possible to barter.

Projects which increase food supply. Changes in agricultural technology have generally not worked in favor of African women. Subsistence crops and market crops have been ignored by researchers and extension workers, while cash crops and farm machinery were considered appropriate only for men. There are signs of change, however. An Integrated Farming Pilot Project in Botswana which was started in 1976 for male farmers to improve their dryland farming and livestock management techniques has since expanded its program to include 100 women. Week-long courses will stress vegetable gardening and poultry keeping. Further, agricultural extension agents will organize special field days to demonstrate new techniques to women. Scattered efforts have been made by Peace Corps volunteers to encourage women to raise bees, poultry, or rabbits, although there is little evidence that these new productive activities were incorporated into the local economy.

The Peace Corps efforts in introducing or improving fish culture in Africa may have a more lasting impact, particularly in northwest Cameroon. Since 1978 some of the volunteers for fish culture activities have been women. The current program in Zaire features the *tilapia*; fingerlings are introduced into shallow ponds which have been built with a plug so that water can be drained for easy harvesting. While men dig the ponds, women carry the agricultural and animal wastes on which the fish thrive. In six months there can be as much as a two hundred percent return.

Income-producing projects. One of the most successful African programs for income-producing is in gardening and pig production in Kenya. Its growth seemed almost spontaneous. While the government is now assisting in marketing, it had played very little role earlier. It is instructive that the women expanded their gardens and small animals once they had time to do so. The *mabati* (the Swahili word for tin roof) movement in Kenya gave women time. Tin roofs enable rainwater to be saved and stored, releasing women from the daily chore of fetching water that takes two to ten hours per household. The women have used traditional rotating credit societies to accumulate cash to buy the tin roofs. Each woman puts so much money in a communal pot; each woman wins the pot with the turn drawn by lot. With the time saved by available rainwater, the women increased their production of vegetables, chickens, and pigs for sale in the urban markets.

Asia. Recently, studies have disaggregated the impact of the green revolution on women and men. In India the overall impact has been a reduction of employment opportunities for women, a trend reported in the Census of 1971. A study in Punjab, India, noted that while displaced men were given an opportunity to take the training necessary to operate new machinery, women were left to work in the increasingly scarce unskilled jobs. This "pauperization caused by the disappearance of their traditional avenues of employment" has pushed many poor women into the cities.

Poverty has made women's jobs on plantations attractive to many poor Indian families, both in India and in neighboring countries. On tea plantations in India and Sri Lanka, women make up over half the labor force; on Indian and Malaysian coffee estates, they make up 44 percent of the labor force, while their participation in rubber estates is only somewhat less. A major reason for this growing female labor force is the wage differentials between males and females: women are paid about 80 percent of male wages for the same work. As production costs rise there is greater incentive to utilize new labor-saving technologies and to increase the percentage of women in the labor force.

Income-producing activities. A major factor which encourages women to increase their economic activity in the monetized economy is the ability to keep control of their earnings. The success of the Korean Mother's Clubs is a case in point. Based on historic cooperation of women in supporting each other in providing expensive ritual festivals for marriage or death, the Mother's Clubs were set up to facilitate the distribution of birth control pills. Three-quarters of the Mother's Clubs organized Mother's Banks. Encouraged by financial resources of their own, women in many villages started projects to earn money with which to build schools, run stores, improve village services. While the groups have now branched out into a variety of income-producing activities, market production including gathering of nuts for sale was frequently the first income-producing activity.

Recent efforts to reach rural poor women in Bangladesh have been impeded by *purdah* restrictions (Islamic traditional feeling against women's activity outside the home). Nonetheless, women's cooperatives are successfully marketing fish, bananas, limes, ducks and chickens, and vegetables. Operating solely with capital saved by the women themselves, these cooperatives are seen as models for the rest of the country. In Yemen, as men are drawn off to work in Saudi Arabia, women are taking over much of the farming. The recognition of women's economic activity is resisted the most in the more conservative Muslim areas. Status is attached to seclusion, except for a small Westernized elite; with the recent revolution in Iran, even that may be subject to change. Nonetheless, it is clear that poor women in all countries, including Islamic ones, must and do contribute to the survival of their families.

Latin America. Women in the agricultural labor force in Latin America, while proportionally fewer than those in Africa and Asia, make up a still impressive 40 percent, according to the Economic Commission for Latin America. This figure is understated, according to Carmen Diana Deere. In her survey of women doing agricultural work in Peru, Deere found that 86 percent of the women in peasant households participated in the agricultural work, as compared to the 38 percent figure in the 1976 Official Peasant Family Survey. Self perceptions are partly responsible; if a man resides at home, he is the farmer. "The majority of the women that considered themselves to be agriculturalists were female heads of households with no adult male present."

In Honduras, 13 percent of the rural households are permanently headed by women; the figure rises to 25-27 percent if seasonal migration is included. These women tend to be landless, and must seek wage employment on the cotton and coffee plantations. In the Peruvian highlands, the transition after land reform from the hacienda system to *minifundio* has relieved women of many servile tasks formerly required by the landlord. But it is difficult for a family to live off the small plots of land. As men are forced to seek wage income off the farm, the responsibilities of the women increase, increasing her self-esteem and status. As landlessness or near-landlessness increases, the poor farmers must increase their wage labor away from home. In Peru and Honduras men migrate seasonally from the mountains to work on large farms. In Northeastern Brazil, the farmers assist with the sugar harvest on the large plantations.

On the Latin American small farms, then, modernization has meant an increase in women's labor as the men frequently seek work elsewhere. In addition, manufactured goods in the market have undercut many local handicrafts previously made by women, making them more dependent on income from agricultural production.

To summarize: New technologies for agricultural production have been concentrated on cash crops and on selected basic grains. Generally the impact of these technologies has been to increase production, concentrate landholdings, and encourage social stratification. In Asia and

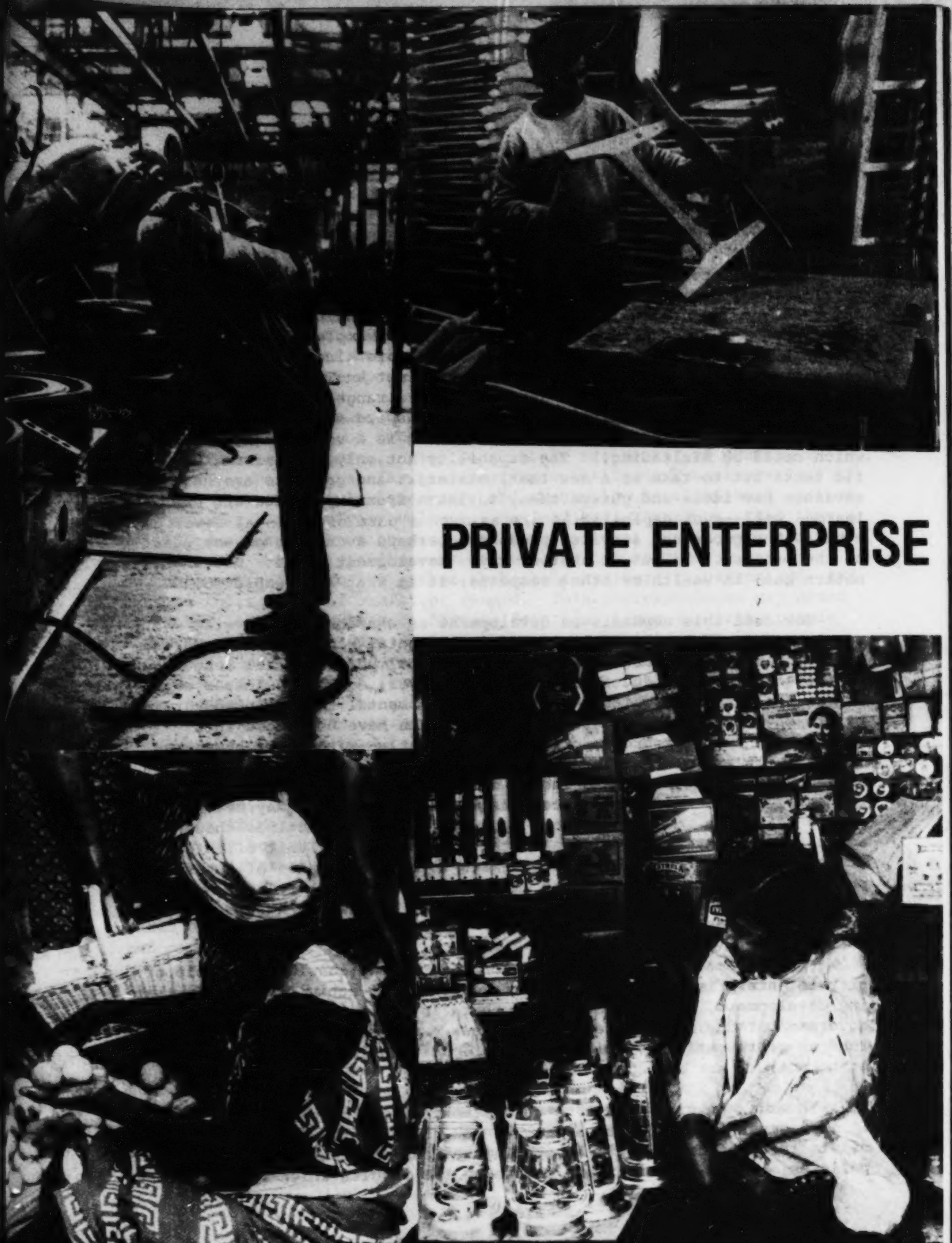
Latin America the wives of larger landholders have greatly reduced their involvement in the fields. There is often an accompanying loss of status: in India, a switch from bride price to dowry has occurred in some areas, as brides are no longer valued for their economic contributions. (Dowries are usual in the Middle East, while bride prices are found in much of Sub-Saharan Africa.) In Africa, well-off farm women tend to remain in the rural areas managing the farms, sometimes hiring other women to help with the harvest of cash crops.

Poor women in all the developing regions have had to work harder as a result of new production technologies which cause their husbands to seek work away from home. Women heads of households or wives of men who migrate to wage jobs elsewhere undertake both the traditional male and female agricultural activities. Families with only a garden plot or splintered field must send all adult family members to work as wage laborers. As new technologies reduce the need for unskilled laborers, a few men are trained for the semi-skilled jobs. Men left in the unskilled labor pool are perhaps worse off than the women; women's wages are less, and they are displacing men in plantation work. Women also have traditionally worked at a greater variety of unskilled jobs and in many countries are able to survive through market selling or handicrafts. Elsewhere, women have joined the urban migration, working for low wages in industries, or as domestics, or becoming prostitutes.

The garden plot where the poor women can grow food to enhance their family's nutrition and then sell the surplus emerges as an important factor in family survival. What is less well appreciated is the major contribution it could make to alleviation of world food shortages. Clearly, greater attention to garden crops and to marketing of fresh vegetables and fruits should be a priority in any planning for rural development. Similarly, attention to small animals and fish culture, both for subsistence and for sale, could add immeasurably to the welfare of the poor.

[Edited extract from Chapter 4 of Women and Technological Change in Developing Countries, edited by Roslyn Dauber and Melinda L. Cain, pp. 51-83. Boulder, Colorado: Westview Press, 1981. Copyright© the American Association for the Advancement of Science.]

PRIVATE ENTERPRISE



Private Enterprise and Development

Gordon Donald, Editor Development Digest

National economic development has a number of different aspects. Developmental progress is most commonly estimated as economic growth, which can be measured with exact numbers, but it includes a number of other things that cannot be so estimated. For example, development has a mental aspect: simply in order to produce more kinds of goods, it is necessary to understand production processes not known previously. Along with such knowledge, the attainment of a range of manual and mental skills is required. (Knowledge and skills are sometimes estimated by educational levels; but years of schooling is a very rough measure which could be misleading.) The capability not only to perform specific tasks but to take on a new task, master it and go on to another, to envisage new ideas and pursue them, to learn from experience and use the lessons well--such capabilities are as much a part of national development as the goods and services produced, perhaps even more at the heart of the process. To put it another way: development is not just what a nation has, in wealth or other respects; it is what its people do.

How does this emphasis on development as what one can do with whatever one has affect the analysis of developmental requirements? It cannot, of course, eliminate the need for physical and financial resources as ingredients of production. It does, however, suggest a lesser emphasis on the extent to which a nation's developmental fate is predetermined by its physical resource base. Some countries have done more than others with such resources, or--more pertinently--with their human resources; for example smaller states with a limited physical base like Singapore and Hong Kong have indeed done well. Similarly, the size of the inflow of financial resources, as measured in money, may not so precisely determine what can be done by a nation as is sometimes thought; again, some countries have done better than others per unit of inflow. It is useful for economists and planners to make estimates of future output and income based on measured inputs of resources; but it is not necessary to regard such mechanical estimates as laws of nature, as the only possible outcomes.

From the point of view just described, we may consider the role of private enterprise, as distinct from governmental activities, in furthering development. This is a current theme in the thinking of the U.S. government today; but the editorial views expressed here should not be read as representing official policy or positions. This is a personal statement.

In order to give credit to the potential role of private enterprise it is necessary to indicate a view of how governments work. It is normal to think of governments as stating national objectives, formulating policies, making decisions and obtaining the results which the decisions are intended to accomplish. This probably exaggerates, not so much the power of government as a whole as the power of individuals in government to make things happen as they wish. In almost any government there are some opposing forces, groups with different ideas and interests contending with each other. Policy decisions may not be carried out as intended for a variety of reasons--internal opposition, inertia, inconsistencies, etc. However, they are generally presented to the world as "the Government's" action or opinion. Individuals and their roles--except for the formal leaders like ministers or head of state--tend to be submerged. This has the effect of making governments appear to be unified and concerned with national purposes.

In contrast, private businesses and production activities are conducted for the profit of owners and their associates, without pretense of higher social purposes. They serve their customers, of course, whether they be traders, farmers, craftsmen, or factory managers; and if they did not, they would lose money and eventually be eliminated (unless they possess a monopoly privelege). One may say, therefore, that they do serve society, providing goods and services that people need and want. They do this with varying degrees of satisfaction to others, and this ought to correspond to the extent that their business is patronized, and thus to their level of profit or reward. This correspondence may often be rather loose, perhaps even hard to detect at times--unworthy people may seem to prosper. Nevertheless there is a discipline at work: unless people are compelled in some way they will not buy what they don't want to buy; and without that, the income of the seller of unwanted services cannot materialize. Thus, it can be said that it is the very selfishness of the private entrepreneur which causes him to serve society.

These ideas are not new. In fact some would say that because some of them were first formulated by Adam Smith in the 18th century they are now outmoded, and for that reason alone are inferior to more "modern" socialist thinking. Others may feel that ideas originating in Western nations may be appropriate under Western conditions but do not meet the somewhat different needs of the conditions and cultures of today's developing countries. These subjects will be taken up below. But first it needs to be pointed out how people's unconscious assumptions are influenced by the situation described, where governments appear to be unified and concerned with social purposes because their spokesmen talk in this way, while private parties have no such voice and are assumed to be selfish, uncoordinated, and even hostile to social concerns affecting their pocketbooks.

This is an issue of moral consciousness, and also one of developmental efficiency. Moral traditions vary among nations and among the subcultures within nations, as well as shifting through time, so it is not universally true that commercial values are either looked down on or held in high esteem. But there does appear to be a tendency for certain occupational groups, at least, to despise private traders; civil servants in particular seem to do this in a variety of settings. This may take the form of a feeling that traders make a profit by "exploiting" poor people, whether farmers or customers; it also commonly takes the form of an assumption that if something needs to be done it ought to be performed by government, which will do it properly, rather than by private parties who will serve their own improper ends.

This assumption has consequences for developmental efficiency. For example, farmers need more fertilizer, and a ministry will distrust the ability of a nondescript group of traders to get it to them cheaply and properly; so a state enterprise for fertilizer distribution is organized, and is given orders on how to perform its functions. Generally, this kind of enterprise is slow to move. It gets fertilizer to some farmers and not to others, often too late for optimum use; it fails to explore new farming areas unless pushed from above; and bribery is not unknown where fertilizer is in strong demand. Farmers may get cheap fertilizer if it is subsidized; but the costs of getting it to scattered rural areas are generally higher in state operations than in private ones. And the state enterprise is never punished for failures, or even made aware of them, but goes on getting its subsidy as needed.

Here is a simple and representative problem in efficiency and morality: would private traders do this job better? It cannot be guaranteed that the profit motive will drive traders into all the rural areas in search of business, but this seems more likely on the whole than the results of whatever it is that motivates bureaucrats to explore new activities (they are more reliable in performing established routines). Will the traders be more responsive than a state agency to special local needs, or to emergency shortages? This too seems probable. Will the traders charge farmers too high prices? This depends on two elements. First is the matter of competition: if fertilizer dealers can establish local monopolies, high prices can be expected, and price ceiling regulations would be hard to enforce; but if enough traders come to offer farmers a choice of suppliers, prices will come down. Secondly, the price at which fertilizer is made available to distributors (private or public) may or may not be subsidized for the benefit of farmers; there are different ways of doing this, with differing results. (The subsidy to state enterprises mixes up the subsidy on initial fertilizer prices with a subsidy for inefficient operation.) Finally, will traders be living at a high income level on their profits made from poor farmers? This question should be rephrased to ask whether the average (not the most prominent) rural trader is living at a higher level than the average state enterprise unit manager (including both his legal and irregular income); and whether the incomes in question have been justly earned by superior service to farmers. Such a question is rather complicated and requires specific knowledge to answer; it seems to me desirable to put the moral issue in this form.

The example of fertilizer distribution may be somewhat biased in the direction of activities which state enterprises usually do badly.

There are fields in which their performance is better--generally where large centralized operations are needed, rather than dispersed, exploratory or innovative actions. There are also situations in which private organizations could not in any case be formed on a sufficient scale, so there has to be a state enterprise or nothing. And of course there are a number of good as well as bad performers among state enterprises. It is noticeable that the most efficient tend to be those which are treated by their governments as if they were as independent as a private firm. When a government does not automatically subsidize the firm's deficits, does not insist on political appointments, does not overregulate its activities, or require certain favored customers or sources of supply, the level of the public firm's performance is likely to be higher--other things being equal.

This kind of thinking is not just the complacent view of those who are accustomed to capitalist economies, but it is emerging increasingly in Eastern Europe and China where private enterprise has been absent for many years (except in small-scale or illegal forms). In all of these countries there was an initial wave of industrial build-up, followed eventually by varying degrees of stagnation, and in time a questioning by some intellectuals on pragmatic grounds of the hitherto sacrosanct socialist doctrines. Hungary has gone furthest toward a return to the profit motive for socialist societies, and others including China are moving in that direction. In Western Europe too, where a wave of post-war interest in socialist methods led to the creation of various nationalized entities, there has been a reaction against state enterprises that kept on needing subsidy while failing to perform as desired. This is not, of course, a unanimous view in East or West, but an apparent general trend (France, for example, is moving against the trend). But it is interesting that some of the newer socialist thinking in Western Europe is turning toward worker self-management and worker ownership of enterprises, rather than the traditional etatism--i.e. government ownership and operation.

The reasons for this apparent trend toward a new appreciation of what the profit motive can do for society if allowed greater freedom of operation may not be quite those cited by Adam Smith to counter 18th century mercantilism, though they are not completely different. A key element is that of motivation: if socialism is conducive to stagnation, it is because rewards in a governmental type of hierarchy usually go to the cautious fellow who makes many friends and few disturbances, who "does not rock the boat." Adventurous spirits, proponents of new ideas, or even those who work extra hours on the job may be unpopular, and unpromoted. This tendency might also be noted in some private corporations, banks for example. But all the same, the man who goes out and brings in a new area of business, or finds a better way of running a machine or designing a product has more chance of reward in the private sector. And the cumulative impact of a number of small actions that bring small improvements can add up to significant national totals.

It does not automatically follow that developmental innovations will come about when a government merely sits back and lets them occur in the private sector, as might be claimed for the Western countries. Governments in developing countries must play a more activist role than they need to in Europe or North America. It is not laissez-faire passivity that will help so much as a discriminating use of government stimuli to encourage, not to restrict or interfere with the desired private sector activities. This is more or less what one finds in the fastest growing economies that do not benefit from oil exports, ranging from a large one like Brazil to the smaller Asian states--South Korea, Taiwan, Hong Kong, Malaysia, Singapore--to such African countries as Kenya, Malawi and Ivory Coast.

This notion of an activist but facilitating policy is a subtle concept, one which will require different interpretations for different cultures and situations. We in the United States are accustomed to an emphasis on financial rewards and competitive markets; we are not uncomfortable with an assumption of selfishness in motivation--as a general common denominator. Our system of rewards is certainly not perfect or foolproof, but it works out to serve the public a good deal of the time. Elsewhere some of these aspects may be questioned, and different emphases would be appropriate. In U.S. tradition, businessmen are well respected; in some other traditions, public officials or the military may have higher social esteem as well as political position. In such societies the contributions of people who organize productive activities and provide services need to be more fully recognized, for it is they who supply the substance of developmental growth. But whatever the differences in shading of the policies most appropriate for stimulating active growth in different countries, a few salient points would seem to apply generally.

One is to beware of an automatic assumption that if something needs doing it must necessarily be the government which does it. Governments must, in most developing countries, participate in major decision-making, but they may do better in many cases to take their distance from the actual administration of economic enterprises, even though they support the purposes involved. The temptation to control everything from the center should be resisted in the interests of fostering a spirit of self-confident initiative, even though it can mean that the more independent private managers may make some mistakes which might have been avoided under centralized control. The process of learning-by-doing is extremely important to development--especially under a definition of development as what people can do (rather than what they have). In the longer run a system of decentralized control, working indirectly through stimulus and reward to desirable initiatives, will be more creative, will produce a wider spread of human capabilities than would the effort to make everything go "correctly" through centralized controls. This is at the heart of the case for private enterprise, stated in positive terms.

Some readers may feel that this is all very fine and idealistic, but it does not fit the realities of greedy human nature. If one does not keep an eye on the activities of private individuals engaged in "nation-building" enterprises, it may be said, they will break all the rules and grab what they can for themselves. Numerous examples of improper self-enrichment may be cited to reinforce this view of what can be expected. The issue raised here is not so much that of how cynical one needs to be about human nature as it is the use of a double standard. If selfish actions are predicted from private individuals, this could legitimately be predicted also from individuals in the public sector. Again, numerous real-life cases of improper self-enrichment by public officials may be cited. Who is going to watch whom?

The case for private enterprise, when stated in more negative terms, is that both public and private sector individuals can be expected to show a good deal of selfish motivation. Nations that find dynamic, idealistic leaders to carry them through important transitions are, to that degree, fortunate; but most of life consists of non-dramatic daily events and relatively ordinary people. If unusual idealism is not to be relied on, the question becomes one of whether the selfish motives of private decision-makers are likely to do more for society than those of public managers. Obviously one needs some people working in both sectors in any country, but there is room for choice in the emphasis that one or the other is given in developing new economic activities. And the argument for private enterprise is that private profit can serve society, that the discipline of producing to please one's customers better than another producer, and of finding new activities that will become profitable, are pressures with important social value.

The outcome of selfishness in government officials, on the other hand, is more questionable. Ambition may well induce them to pursue important national goals with vigor, to be sensitive to the needs of groups whose support they need for advancing a career, and to refrain from improper behavior for fear of exposure. But the urge for money and power can also have results harmful to society which are well known and need not be spelled out. And these descriptions apply to leaders and would-be leaders, while most public actions are taken at lower levels of the civil service, where less ambitious forms of selfishness prevail. The government clerk or middle-level functionary, whose activities provide the counterpart to a small-scale private firm manager, is chiefly interested in his security, and--especially in inflationary environments where civil service pay falls behind prices--in some extra income; he may develop skill in knowing and manipulating complex regulations, in ways of helping his friends, etc. Under the right supersion this motivation can be useful in promoting dependable service, but it may also work very much the other way; and the rewards and punishments for government personnel are most often determined on grounds irrelevant to the furthering of national development.

The motivation of ordinary people in government is too often omitted from consideration in ideological discussion. Socialist writings and speeches, in particular, tend to ignore any motives of public employees; government is just taken for granted as an instrument that can and will carry out whatever the author or speaker would like to see happen. In Marxist analyses, antagonistic class interests are insisted on under capitalism; but with socialism, the existence of a ruling bureaucratic class which could have its own interests and compulsions is never recognized. This line of thought seems quite unrealistic, and indeed wishful--it would be splendid if governments were run by persons of divine wisdom whose orders were perfectly carried out, but this seems unlikely. So, with the prospect for fallible human beings manning both the public and private sectors, the case for private enterprise rests: partly on the greater utility of selfish motivation in the private sector; and partly on the positive gains for building and diffusing developmental skills and experience when control and responsibilities are decentralized. Greater dynamism and innovation, along with market discipline, are to be expected.

This subject cannot be concluded without some mention of income distribution, although it can only be treated briefly here. One of the major criticisms of a capitalist system relying on private enterprise is that it favors the rich over the poor. (The word capitalist by definition suggests someone rich who can invest money and get a return from it; one does not usually think of the local shoe repairman as a capitalist--which he is.) There does appear to be a tendency toward greater income equality in the purely socialist countries, and also in the poorest countries where nobody has very much; the greatest inequalities are found in middle-income countries where there is an important mineral export like oil, or where landholdings are highly concentrated. In general, the middle and lower-middle income countries with mostly mixed economies show greater income concentrations at the top of the scale than do the Western capitalist countries. So the association of capitalism with income inequality is a lot less clear than is sometimes thought, but it is not zero.

If private enterprise economies are more dynamic than socialist economies in the longer run, as argued above, and if this is because success in meeting the demand of the public for goods and services is better rewarded in the private system, does that mean that income inequality is the necessary price for dynamic growth? Many people believe that it is, and that this price should be paid in the interests of a nation's future. Others may find that the price is too high, and opt for egalitarian policies, identifying their view of development with progress for the poor even at a cost to national growth rates. The former group would object that the poor will be better off in the end with higher growth, even if they have to wait longer for the benefits to arrive. The egalitarians, aside from applying a different moral standard, may feel that a generation is too long to wait for an uncertain outcome. This kind of argument will not be settled here.

In my view, the overall distance between major income classes is not exactly the key to growth--after all, some of the champion growth rates are found in countries like Korea and Taiwan with unusually equal distributions. What matters more is how an individual gets ahead, whether it relates to his contributions to development goals. The presence of extremes of wealth and poverty usually implies an important share of inherited wealth in an economy, and this will fail to stimulate either rich or poor to put forth greater efforts. But lack of stimulus also results from generalized income equality unaffected by performance levels. There must be some degree of reward and punishment in order for income stimulus to take effect--which implies at least moderate differences in income levels, and for individuals there must also be the possibility of moving up. This mobility also implies some possibility of moving down, and therefore a degree of insecurity. Above all, the achievement of income improvements should result from productive work, and not simply from political power or monopolistic position.

In many of today's mixed economies, some of the larger private incomes have their origins in governmental favoritism and regulations, like favored access to scarce import licenses or to permissions to conduct a business with a monopoly situation. Where this is true, such incomes should be attributed to governmental actions rather than to private endeavor _per se_. True, the private businessman no doubt actively sought the privilege, and may have paid bribes to get it; but there would be no bribery unless there was a government-created monopolistic privilege to be sought, and an official ready and eager to get paid. This consideration does not take care of all the moral questions involved, but it has a bearing on the impression that some people get of private business having some association with ill-gotten wealth.

As a general proposition, one may state that any enterprise holding a monopolistic position, whether it is a private or public enterprise, will be less likely to strive to serve the public than it would if the public had other suppliers to whom it could turn. A monopolistic enterprise is also likely to extract higher prices, and to pay higher salaries to its officers for less work, than the same enterprise would if it had to face competition. And it is generally true that state enterprises try to achieve and are often given monopoly positions in some field. Thus, monopoly is the enemy of progress, and also of equal opportunities and equity in income distribution. If monopoly is associated with private enterprise, then the remedy is not to replace it with an even more comprehensive socialist monopoly, but to stimulate more and more private enterprises to challenge it with more competition in its services to the country.

A few policy implications of this way of looking at development may be noted in conclusion. Every country has its own history, institutions, and particulars in its current situation, so these ideas may have more applicability in some situations than in others. What can be stated in general terms is the following:

If development means the accumulation of human skills and capabilities conducive to economic growth, then the stimulus of producers and managers to greater efforts and to a greater search for useful innovations deserves priority for achieving developmental progress. Therefore, incentives are important; and among these, one of the most reliable and best understood for policy purposes is the econonomic incentive. To tap economic incentives for the benefit of society, there must be differential economic rewards resulting from productive contributions. Such rewards can be expected from the competition of private producers, provided the market is not too greatly biased by monopoly privileges. This danger is most effectively countered by policies which encourage producers to enter into fields where increased goods or services are in demand, and where profits are probable.

The means for such encouragement are many: banking policies which extend credit to new and small entrepreneurs, not just to established firms; government support for training opportunities, ranging from university subjects to practical skills, coupled with some form of apprenticeship arrangements; systematic study by government of unfamiliar technical alternatives and new fields, together with methods for disseminating such findings to would-be private users--whether in extension networks to small business (analogous to agricultural extension) or more sophisticated communication of more advanced technology; and a minimum of the usual "red tape" requirements for licensing and approval of new firms. Actions that can result in monopolistic privileges should be avoided. Where state enterprises exist, a government should sell its shares in such enterprises to private persons and use the money from sales to help finance new enterprises. Beyond this, an activist government will be on the lookout for new markets for its country's products and unfamiliar products it might be able to make, and also for unusual policy devices that have served as successful stimuli elsewhere. The objective in all this is to provide its people with the self-confidence resulting from successes in "learning by doing."

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RURAL DEVELOPMENT

RURAL DEVELOPMENT.
RURAL ROAD CONSTRUCTION
IN ETHIOPIA.
(PHOTO: WORLD BANK GROUP--K. MULDOON)

Organizing For Rural Development: A Learning Process

David C. Korten

[The shortcomings of prior and current attempts to promote rural development are surveyed. Then four diverse examples of success are described and analyzed. Their common element is not found in a particular method but in a process of learning from experience and applying such lessons. The implications of this for development planning are examined.]

There has been growing interest in new approaches to national development intended to bring the poor more rapidly into full participation in development decisions, implementation, and benefits. Many observers have looked to effective community-controlled social organizations as important if not essential instruments if the rural poor are to give meaningful expression to their views, mobilize their own resources in self-help action, and enforce their demands on the broader national political and economic systems. However, the results of experimental projects and programs have been generally disappointing, and there is no widely accepted theory on how such organizations should be established. In particular, experiences over the past three decades with cooperatives and community development movements in the Third World provide some sobering lessons.

Failures of the Past

Cooperatives. The member-controlled cooperative has long been an idea with almost universal appeal, being widely promoted in much of the developing world as an integral instrument of national rural development policy. But the typical outcome can be summarized briefly: "Rural cooperatives in developing areas today bring little benefit

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to the masses of poorer inhabitants of those areas and cannot be generally regarded as agents of change and development for such groups. It is the better-off rural inhabitants who mainly take advantage of the cooperative services and facilities, such as government supported credit and technical assistance channelled through cooperatives." (Rural Cooperatives as Agents of Change, p. ix. Geneva: U.N. Research Institute for Social Development, 1975).

Often the services offered by cooperatives, such as production loans and marketing services, are of little use to the landless laborer or the subsistence farmer. In relatively stratified communities the poorer members seldom have a voice and commonly find themselves ineligible for certain services such as loans. Moreover, too often the co-op leaders are corrupt and abusive of their power. Where the poor have organized their own co-ops to challenge established community interests they have commonly faced retaliatory actions they were ill-equipped to resist. One reason suggested for the failures is that these cooperatives too often have been creations of government, intended to promote government policies and provide government control over markets, rather than voluntary creations of individuals to increase their collective market power.

One study of 14 cooperatives in Iran, Pakistan, Bangladesh and Sri Lanka found four that were comparatively successful. These had four characteristics in common: (1) they were located in communities with relatively unstratified and cohesive social structures; (2) their internal structures allowed members to hold leaders accountable and enforced member discipline; (3) a relatively homogeneous membership of small and medium landholders saw the co-op as an instrument for capital formation and the introduction of technical innovations rather than simply a means for obtaining government facilities; and (4) they had strong external linkages with relatively effective government agencies which not only regulated their functioning but also provided training, services, facilities, and assistance in resolving conflicts between members. Such preconditions are of course demanding and not always replicable.

Community development. It was a well publicized pilot project introduced in the Etawah District of Uttar Pradesh, India in October 1948 which initiated the chain of events that brought the community development movement into prominence in the post-colonial era. Using multi-purpose village-level workers, the Etawah project achieved impressive results in self-help approaches to increasing agricultural production and strengthening rural infrastructure. In 1952, the Indian government adopted the concept as the basis of a major national rural development effort. However, it failed to adopt the painstaking approach to developing a participative administrative structure able to respond to bottom-up initiatives, which had been the key to the Etawah project's success. The attention attracted by India's launching of a national community development effort led to the initiation of similar programs in over 60 nations of Asia, Africa, and Latin America during the 1950s. But by 1960 some programs were already faltering, and by 1965 most had been terminated or drastically reduced. Community development had promised much, yet delivered little.

With changes in national governments came the desire of new leaders to establish their commitment to new and, presumably, more powerful development concepts. Central economic planning was embraced, with an emphasis on programs promoting immediate economic growth. Community development offices were abolished or integrated into other organizations.

The decline may have reflected impatience as much as anything; perhaps it was unrealistic to expect any program to achieve significant results in the reduction of poverty and food shortages in so short a period. But a number of characteristic weaknesses have been identified by various scholars in the concept and its implementation.

(1) Existing power structures were accepted as a given, and no attempt was made to change them. Village level workers aligned themselves with the traditional village elites who captured such benefits as the programs offered. Recognizing this, the poor majority did not respond.

(2) Responsibility for implementation of community development was placed in administratively separate ministries or agencies which paralleled the established line agencies of government. This resulted in bureaucratic conflict that was often a key element in the movement's demise.

(3) Greater emphasis tended to be placed on expansion of social services than on increasing rural incomes, and many of the social services offered seemed of doubtful value.

(4) Programs and targets were formulated centrally with little regard to the willingness or capability of the people to respond; often little real participation was involved. Demands that field workers report on the implementation of dozens of centrally mandated activities seriously cut into the time available for actual work with the community. When working with the community, the field workers easily fell into the pattern of actually directing local level programs.

(5) Little was done to build independent member-controlled local organizations able to solve local problems and make demands on the broader system. Furthermore, the village itself tended to be treated as a self-contained development unit.

Current Donor Experience

The current concern for the rural poor and their participation in the development process has had an important impact on national agency and donor funding priorities. But experience indicates that the reallocation of funds is not enough. The types of projects currently in vogue present difficult problems which remain to be solved, and their solution is inhibited by programming procedures better suited to large capital development projects than to people-centered rural development. In the discussion that follows the focus is on large donors, because the information is accessible and their numbers are few. National development practitioners are in general working with priorities and programming methods similar to those of the major donors--in part as a result of donor influence--and face corresponding pressures.

Experience with poverty-focused programming. The World Bank has responded to the new emphasis on poverty by realigning its loan portfolio to increase the proportion of loans going to countries with an annual per capita income below $280. It has also substantially increased the percentage of its portfolio devoted to agriculture and rural development projects, and since FY73 over half of these projects have been chosen and designed specifically to benefit the rural poor. Similarly, under the 1973 foreign assistance legislation passed by the United States Congress, the priorities of United States Agency for International Development (USAID) were reoriented; it is largely restricted to assistance targeted directly to the poor majority--with participation a major theme.

Unfortunately, good intentions seldom suffice, and the difficulties have surfaced fairly quickly. A discussion of "new-style" rural development projects in the World Bank's 1978 Annual Report observed that:

> ". . . with hindsight, project design and the pace of implementation have been too ambitious, resulting in delays and shortfalls from original expectation . . .. Among the more difficult aspects is the establishment of systems within which small farmers can themselves have a say in how programs are designed and implemented, and how their skills, expert knowledge of the local farming environment, and their capacity to help themselves can be fully integrated into an overall effort."

Awareness of the need for change in approach at the Bank is growing, but the magnitude of the changes in procedures and staff composition called for is great. Some "New Directions" USAID projects earlier looked to as prototypes of the Agency's new emphasis on popular participation have revealed similar gaps between the planning concepts and the realities of implementation.

Some fairly substantial amounts of money are presently being channelled to the Third World through private voluntary organizations (PVOs), many of which have been going through a sometimes painful reexamination of their roles. Organizations such as Catholic Relief Services, Save the Children Federation, World Vision, CARE, and Church World Service have built major international programs based on relief and welfare activities. Recognizing that the answer to poverty lies not in relief but in increasing the capacity of the poor to meet their own needs, they are in varying stages of creating more developmentally oriented programs.

Viewed in historical perspective, the current "new directions" are perhaps less a new thrust in development assistance than a return swing of the pendulum as the results produced by the economic planners during their period of ascendance come into question, much as did the work of the community developers before them. Lane C. Holdcroft suggests in "The Rise and Fall of Community Development in Developing Countries" that too little attention was given to building a coherent body of knowledge out of the theory and empirical experience of the community development era, with the result that many of its lessons remain unlearned. Fortunately, not all of the lessons have gone unobserved. More emphasis is now placed on making participation a concern of all agencies engaged in rural development, on economic benefits, and on regional integration. Yet, other lessons seem to have gone largely unrecognized. Thus, we continue to see: (a) reliance for the planning and implementation of "participative" development on centralized bureaucratic organizations which have little capacity to respond to diverse community-defined needs, or to build from community skills and values; (b) inadequate investment in the difficult process of building community problem-solving capacity; (c) inadequate attention to dealing with social diversity, and especially with highly stratified social structures; and (d) insufficient integration of the technical and social components of development action. These are areas in which the barriers to appropriate action have proven most formidable, and it is important to stress that the lack of money is *not* the central problem.

Constraints on public donors. If a lesson emerges out of this accumulated experience, it is that in dealing with the poor, redirection of funds to new categories of projects is only part of the need. Another part is building the capacity of donor organizations--whether public or private, foreign or national, planner or implementor--to provide assistance in ways which respond to local needs while building local social and technical capacity. Unfortunately, most large donors seem to be under substantial pressure not to follow this latter course.

Excessive pressures for immediate results, as measured by goods and services delivered, drive out attention to institution building and make it difficult to move beyond a relief and welfare approach to poverty: the distribution of food is a lot faster than teaching people how to grow it. A substantial bias toward *project* as contrasted to *program* funding compounds the problems. Projects by nature deal with time-bounded costs and emphasize facilities and equipment, to the neglect of the development and funding of capacities for their sustained operation and maintenance. Their demands for detailed, upfront planning, coupled with rigorous adherence to fast-paced implementation schedules and pre-planned specifications, assume that task requirements are well understood at a stage when, in fact, even the nature of the problem is ill defined. Furthermore this virtually ensures that the real decisions will remain with professional technicians and government bureaucrats, neither of whom are rewarded for being responsive to local conditions or for contributing toward the development of local institutional capacities.

Emphasis on meeting project disbursement schedules and on terminal project outcomes leads to an insistence on the creation of special project units, using special incentives to buy people away from more permanent organizations and, thus, undermining their potential for sustained long-term action. Pressures to move ever larger amounts of money quickly without commensurate staff increases place a premium on large capital- and technology-intensive projects. As a consequence, heavy import components are best able to absorb such large sums of money on schedule, whereas effective work with the rural poor requires a high ratio of people to financial input; and it almost always takes longer than anticipated. When a large donor such as the World Bank operates with few field offices, relying instead on the supervision of itinerant groups of experts with divergent views making quick judgments during short visits, there is little prospect of providing the consistent, informed, and sympathetic support required for effective institution building.

In general the need is for a flexible, sustained, experimental, action-based, capacity-building style of assistance which most major donors are ill equipped to provide. The result is a substantial gap between what donors espouse as policy and what they actually find themselves pressured to do by their own political and bureaucratic imperatives. (See Figure 1; based on Robert Chambers, World Development, February 1978, pp. 210-11.)

FIGURE 1
Contradictions in Foreign Assistance Programming

Poverty-focused rural development involves projects which are:	Donors remain impelled to prefer projects which are:
Small	Large
Administrative and personnel-intensive	Capital- and import-intensive
Difficult to monitor and inspect	Easy to monitor and inspect
Slow to implement	Quick to implement
Not suitable for complex techniques of project appraisal	Suitable for social cost-benefit analysis

As an example, the Asian Development Bank's (ADB) stated policy in irrigation development is to emphasize: (a) low cost per hectare, (b) many small farmer beneficiaries, and (c) production gains within a short time, such as two to five years. These criteria should lead it to emphasize rehabilitation of small irrigation systems. But in such systems the costs are so low, and spread among so many individual systems, that it is difficult to build a substantial project loan around such work. The average ADB irrigation loan was for $40 million in 1978, with the pressures in the direction of increasing this average as the ADB sought further expansion of its total lending.

A partial answer is greater emphasis on program as contrasted to project funding, and both the World Bank and the ADB are currently experimenting with program-style loans less tied to schedules and blueprint-style plans. However, unless institutional capacity building is included as an integral part of the loan package, the approach assumes the prior existence of strong administering organizations able to take a responsible, flexible, and locally responsive approach in the commitment of its funds. Generally such an assumption is unwarranted.

USAID provides its own examples of contradictions between purpose and procedure. In preparing a Project Paper for approval in Washington the USAID program officer must comply with detailed specifications spelled out in a guidance document of more than 100 pages. Nonetheless, USAID is on the whole making the most serious effort of any large donor to come to grips with the problems of improving on past performance in dealing with rural poverty.

The Positive Side: Four Asian Success Stories

As discouraging as the general picture is, not all efforts at participative approaches to rural development have failed. This section presents cases from Asia on experiences that share three characteristics: each involves a rural development effort which seeks to engage rural people in their own advancement; each is generally recognized as more successful than the average; and each is dependent on effective program action more than on a uniquely favorable setting. Beyond that, the cases were chosen for their diversity in objectives, setting, and approach. These cases on individual programs cover the Indian National Dairy Development Board, the Sri Lankan Sarvodaya Shramadana Movement, the Bangladesh Rural Advancement Committee, and the Philippine National Irrigation Administration Communal Irrigation Program.

1. Indian National Dairy Development Board (NDDB). The system of dairy cooperatives promoted by the Indian National Dairy Development Board has attracted international interest. By the end of 1976 a total of 4,530 village cooperatives with a membership of 2 million farmers had been organized, and efforts were underway to develop a system of similar small milk producer cooperatives throughout India. Members of the village level cooperative society normally own one or two cows and deposit milk twice each day at the collection point maintained by the society. Special trucks collect the milk from the village storage vats and deliver it to processing centers operated by a cooperative union comprised of some 80 village societies. Processed dairy products are sold in major urban centers through the facilities of a federation of the dairy unions.

Studies indicate that the program operates with a high level of efficiency and lack of corruption, and provides major social and economic benefits to the poorest members of the member villages while assuring urban consumers of a regular supply of quality milk products at fair prices. It has also contributed to a weakening of caste and sex barriers, as all castes of both sexes have learned to wait their turn in a single line to deliver their milk. Several features of the program contribute to its success:

- The benefits are accessible to the poorest members of the community as even a poor landless family can maintain a cow, a practice well established by tradition in India.
- The village co-ops are backed by a strong and highly disciplined support system which provides at a fair price the entire range of services required for profitable production, from veterinary care and feed to an assured market.
- All technologies and methods employed have been proven under local conditions.

- Everything is done according to carefully developed systems in which those responsible are thoroughly trained.

- A combination of strong, externally-audited management systems, daily payments to members, and public transactions (including tests for quality of the milk) leaves little room for dishonesty on the part of co-op officials. With little opportunity for corruption, only the more responsible individuals are attracted to leadership positions.

- The basic functions of the village milk cooperatives are so simple that few demands are placed on their leaders and members, either for communal labor or for complex decisions that might favor one group over another.

The strong and sustained leadership of Verghese Kurien, the founder and head of the NDDB, is also important. However, another critical factor is more easily overlooked: the process by which the NDDB came into being contrasts sharply with that of the more typical, centrally organized, government sponsored co-op movements in Asia in which the members usually have little interest beyond collecting government handouts. The NDDB, which traces its history back to the mid-1940s, is a creation of farmers responding to a felt need. India's colonial government had contracted with a private dairy to purchase and process milk from villages in Kaira District of Gujarat State for sale in Bombay, and the farmers who supplied the dairy grew resentful of the low and fluctuating prices being offered. Eventually, a boycott of the government scheme was organized which led, in 1946, to the formation of the Anand Milk Producers' Union Limited under the chairmanship of Tribhuvandas Patel, one of the farmer members. By 1947, eight village cooperatives with 432 members were operating under the cooperative union.

By 1949, a young man named Verghese Kurien, fresh from a U.S. university education, bored with his unchallenging government job, began advising the union on the purchase of dairy machinery. He was later asked by its members to help them with its installation and the training of their workers, and stayed on to become manager of the cooperative. Kurien learned along with the farmers in a village setting. Once a successful prototype program had been worked out, largely by the farmers, it was not passed to some established organization for broader replication. Rather, a new organization grew around the prototype--from the bottom up--gradually building and testing its own capacity to provide effective support to federations of primary cooperatives, and adding additional layers at its top as the program expanded. Appropriate management systems were worked out through experience to meet the demands of the program. The values of integrity, service, and commitment to the poorest member-producers were deeply imbedded in its emerging structures. Management staff were hired fresh from school, trained through experience on the job, indoctrinated in the values of the program, and advanced rapidly as it grew.

The process of bottom-up learning and growth from within continued for 10 years before the effort extended beyond Gujarat state, when the National Dairy Development Board was created in 1965 with Kurien as its head. The NDDB is currently planning a major expansion program to be funded by a $150 million loan from the World Bank and sales of dairy commodities donated by foreign governments. It will also move simultaneously into a new program of vegetable oil cooperatives. To the current professional staff of 600, the new programs will require the addition of 400 new managers per year for the next several years to be trained in a new NDDB-established management school. The rapid expansion into states which present different institutional settings will no doubt place substantial pressures on the NDDB. It will be instructive to see whether it can replicate its own success under such conditions.

2. Sarvodaya Shramadana Movement of Sri Lanka (SSM). The Sarvodaya Shramadana Movement (SSM) of Sri Lanka is both private and national in scope, has a strong religious orientation, operates without formal ties to government, and, like the Indian NDDB, was built from a modest village experience by a bold and charismatic leader. [See Development Digest January 1976, p. 81.] Yet, while the NDDB was built on a structure of carefully designed management systems and emphasized economic outcomes, the SSM has given more of its attention to the articulation of its philosophy than to management systems, and has emphasized changes in the heart of man over changes in village economies and social structures. It represents a search for a development model consonant with the unique cultural and spiritual heritage of the Sri Lankan people.

The SSM operates through a complex structure, encompassing a variety of voluntary membership groups loosely linked by formalized, professionally staffed administrative structures. The preferred village level organization includes individual groups for youth, mothers, farmers, children, preschoolers, elders, and for persons with special education and skills. At the national level there is a large executive council comprised of officers of the Movement, directors elected by the general membership, and 35 persons invited for their particular expertise. Six regional Development Education Centers which provide the primary support facilities are linked to the villages through 74 extension centers. Activities are diverse and generally loosely structured, with a philosophy that individual community programs should emerge as an expression of the needs of the people.

The origins of SSM trace back to 1958 when a government rural development officer proposed to the teachers of a small Buddhist secondary school that they seek to acquaint their students with the problems of rural life through participation in a work-study camp in a poor rural village. One of these teachers was the young A. T. Ariyaratne, around whose philosophy and personality the SSM was later built. The first camp was held in a village of 35 Rodiya families, members of a despised caste that lived by begging. They were barred from attending school or receiving religious rites as no member of a higher caste, not even the monks, would have any association with them: to enter a Rodiya home was nearly unthinkable for a non-Rodiya. It was, thus, a notable event when 80 students, teachers, boy scouts, and government officials from middle-class families set off to share their labor with the people of Kanatholuwa village in digging wells and latrines, constructing a small road, and performing other services. Each participant contributed even the money for his own food and shared in the tasks of pitching tents and food preparation. The camp lasted only 10 days, and participation of the village people except as recipients was minimal. But the significance of the camp was not found in the wells and latrines constructed, so much as in the fact that so many middle-class people had spent 10 days in manual labor in the service of an outcaste class.

The camp was well publicized in the Colombo press and its participants quickly won broad recognition, including a letter of commendation from the Prime Minister. Soon other camps, known as Shramadanas, were being organized, each bringing more urban middle and upper class volunteers into contact with the realities of rural poverty and caste discrimination. In the early 1960s the basic program philosophy, based on Buddist teachings, took explicit shape, and a concern for sustained village-level development action led to recruiting the village monk as a community development worker. The village temple emerged as the center of Sarvodaya development activity. In 1968, a plan was launched for the comprehensive development efforts in 100 villages based on the new concept. Foreign funding was introduced in the early 1970s, leading to the establishment of a permanent headquarters and bureaucracy. In 1975, the 100-village program was expanded to 1,000 villages. Training centers were established to train women who would manage preschool child care and mother-child feeding centers, to prepare youth for community development work, and to develop skills in agriculture and technical fields.

In 1978, a critical study by Professor Nandasena Ratnapala noted that the breadth of Sarvodaya's membership involvement and the strength of its spiritual commitment had not always been translated into program accomplishment. Though activities had been undertaken in 2,000 villages, the programs were more or less permanently established in only about 300. The leadership training and designated patterns of village organization had not, in most villages, resulted in a self-reliant development process. In the training courses, weaknesses were noted in the course content, competence of instructors, and teaching methods. With the introduction of major foreign funding, SSM had introduced radically new program activities and organization forms while simultaneously undertaking rapid expansion before either were tested. While it remained an important moral force and continued to enlist Sri Lankans from all social strata in the cause of the poor, its developmental impact was limited to a small minority of the villages in which it worked.

When Ratnapala's study appeared, Ariyaratne responded by inviting him to join the SSM as head of its newly established Research Institute. While seeking to demonstrate a continuing commitment to the basic philosophies of the movement, the studies of the Institute sought to stimulate sober reflection on the gaps between the philosophy and the realities of its performance. Though some Sarvodaya staff were not pleased by these studies, a number of constructive actions resulted. Sarvodaya's training programs were substantially revamped with emphasis on preparing villagers to make more of the programming decisions for themselves. The screening of trainees was tightened. More training was done within the village. Of the 2,400 villages which had some form of SSM activity as of January 1980, the estimated 10 percent which had developed effective Sarvodayan organizations, generally the very poorest, were to be given substantial autonomy in the planning of their own development activities. Subsequently, the Research Institute's style was reoriented to place itself in less of an adversary role. Findings were discussed with operating staff in the search for solutions to identified weaknesses in program design and staff performance prior to their publication.

Sarvodaya's problems are not yet solved. Development of capacities for decentralized decision making in an organization accustomed to centralized control is not an easy process. But a new learning mechanism has been introduced, and serious attention is being given to making it an effective tool for program improvement.

3. Bangladesh Rural Advancement Committee (BRAC). One of the most attractive of the smaller private voluntary agencies working in rural development is the Bangladesh Rural Advancement Committee (BRAC) headed by Mr. F. H. Abed, a former accountant turned development manager. [See Development Digest January 1979, p. 9.] The reason is BRAC's unusual capacity for rapid learning--through the constant identification, acknowledgement, and correction of its own errors. Its history may be divided roughly into three phases, each of which has involved a major reorientation in its program and produced significant lessons of broader interest.

Phase I: The Relief Approach. The BRAC was formed in early 1972 to resettle refugees in the Sulla area of Northeast Bangladesh following the war of partition from Pakistan. Medical teams provided daily outpatient care in four camps. Resettled refugees were assisted in reconstructing homes and fishing boats. Emergency food supplies sustained them until their fields began producing. Yet BRAC workers were impressed that the living conditions for the typical resettled Sulla resident were little better than they had been in the refugee camps.

Phase II: The Sectorial Approach. BRAC's early development activities consisted of a number of relatively discreet sectorial program activities: construction of community centers, functional education, agriculture, fisheries, cooperatives, health and family planning, and vocational training for women--each of which eventually produced its own new learning. The project area of some 200 villages was divided into 11 sections, each with a field camp supervised by an area manager to whom four to five multi-purpose development workers reported.

One of the first actions was to open 255 literacy centers staffed by 300 villagers trained as literacy instructors. The goal was to eliminate the project area's 90 percent illiteracy within three years. Enthusiasm was high when 5,000 villagers enrolled in the first course. But when only 5 percent completed the course, a review of BRAC staff concluded that the materials and methods used were not relevant to villager interests or needs. Consequently, a materials development unit was established in early 1974 which interviewed villagers to determine their substantial interests, and developed lessons around these topics. Adult learning methods were stressed--mainly group discussions organized around key words, sentences, and arithmetic exercises in which the instructor took an unconventional facilitator role. Materials were tested and teachers retrained in courses designed to develop facilitation skills. When the new literacy courses were introduced to the villages, completion rates for the first two were 41 and 46 percent, respectively.

In health, the threat of a cholera epidemic convinced BRAC's four medical doctors that they could not do the job alone. They quickly trained villagers in the techniques of treating cholera and severe diarrhea cases. Thus began a pattern which all subsequent BRAC health programs have followed: the physician's role would be, first, as a trainer, second, as a planner, and only lastly as a curer. The Phase II health system was designed around paramedics trained to treat 18 to 20 common illnesses, provide innoculations, and educate villagers in preventive health measures. A cadre of female workers recruited family planning acceptors and distributed supplies.

In agriculture, the BRAC workers cultivated their own demonstration plots at their camp sites, which usually consisted of two acres of rice and a half acre of vegetables. As was duly noted by the farmers of the area, this was an unusual activity for college graduates. The stature of the BRAC workers as agricultural advisors was substantially enhanced when their fields produced some of the best crops seen in the area. Farmers in selected project areas received technical assistance through group meetings, as well as assistance in obtaining new seeds and other inputs. Several groups totalling 300 landless laborers were assisted in obtaining leases on 500 acres of fallow government and privately owned land. Irrigation and flood control projects were constructed under "food for work" projects. Other efforts included providing fishermen with boats and with twine for nets. A number of cooperatives already existed in the project area when BRAC arrived, though most were ineffective in serving the broader population. BRAC was able to rejuvenate many through member training, encouragement of regular meetings, introduction of improved accounting practices, and initiation of government audits, and a number of new societies were formed.

As experience was gained in each of these undertakings, the following insights began to emerge. Those who were benefiting most from the BRAC programs were farmers with relatively larger landholdings. While BRAC had been attempting to form all members of a village into a single organization, the interests of landed and landless were so opposed that it was nearly impossible for a single community-based organization to serve them both simultaneously. Each BRAC program was operating more or less independently of the others. The program remained heavily dependent on BRAC staff and leadership. Paramedics had become primarily absorbed in providing curative services, neglecting health education responsibilities. The impact of the literacy program was still limited, as materials were not keyed to direct support of other BRAC activities in the village. Development of women's programs was being inhibited because, with the exception of family planning workers, all BRAC personnel working at the village level were men. In several instances there was no market for the vocational skills developed in BRAC courses. Even with boats available, the fishermen continued to be exploited by those who controlled fishing rights, credit, and markets. Widespread use of the high yielding rice varieties was blocked by the limited output of government seed programs. Of some 15,000 farm and landless farmer families in the project area, only 300 landless benefited from the land program and only 600 farmers benefited from the production improvement efforts.

Phase III: The People Approach. Numerous actions were taken to correct the deficiencies identified in Phase II. Some were fairly specific, such as the decisions to train full-time female village health workers to serve the preventive and simple curative health needs of mothers and young children, and to hire females as paramedics and multi-purpose development workers.

More basic was the shift during 1975 and 1976 toward a more people-centered approach targeted entirely to the poorest 50 percent of the village population--defined operationally as those families whose livelihoods depended in part on selling labor to third parties--with program initiatives coming largely from the beneficiaries. Groups of 20 to 30 were organized around similar economic interests such as landless laborers, destitute women, and fishermen. The functional literacy training was used to build an organization, raise consciousness, and lead into joint activities responsive to identified needs. For example, landless laborers organized to lease land, destitute women to undertake paddy processing, and fishermen to purchase a boat. As projects were identified by each group, BRAC provided resources such as credit or "food for work" grains. Once a few such groups were established in a village, it had been anticipated that they would assist in forming other groups through a building block process until all the poor of the village were organized.

BRAC has been experimenting in its Rural Credit and Training Project and its Outreach Program with a new approach which featured: An initial survey done by outreach staff identifies members of the target group--i.e., those households in which labor is sold to third parties. Informal discussions are initiated at traditional gathering places to identify the major concerns of the poor, and some potential leaders. As leaders are identified they are sent to the BRAC training center at Savar to learn organizing and consciousness-raising methods. As group cohesiveness is built, joint activities are developed based on locally available resources. Functional education is introduced only as the people demand it. Collective action is taken on such concerns as demands for a rightful share in government programs, bargaining for improved wages, share cropping and land lease terms, and schemes to gain control over productive assets. "Food for work" schemes such as the clearing of land collectively leased for farming are planned and implemented under the supervision of their own leaders. Women's activities emphasize productive employment, including cultivation and earthmoving projects, rather than conventional women's activities such as sewing (which would attract women of more well-to-do families). Under the Outreach Program, BRAC workers are not based in the village, thus minimizing the presence of the BRAC establishment.

The approach of the Outreach Program generates some helpful process dynamics. First, the financially more secure villagers normally exclude themselves from participation as soon as they learn that BRAC is not providing handouts and that many of the activities involve manual labor. Second, as the organized poor of a village set about to negotiate for higher wage rates they quickly learn that they can be effective only if neighboring villages are also organized; consequently, they set about on their own to organize them. As word spreads, people come from villages miles away asking the organized villages for assistance in organizing. As the process builds a momentum of its own there is a significant decline in the BRAC staff input required per village organized.

Phase III also brought the introduction of a research unit to analyze fundamental socioeconomic problems. BRAC staff see research as a powerful tool for program improvement, using it to address program-relevant questions relating to the dynamics of rural poverty, seeking insights into questions such as: How are some families able to advance themselves, while others become increasingly impoverished? How do peasants perceive famine? Credit? Such studies, for example, have documented how access to consumption credit in time of crisis is more important to most poor families than access to production credit. BRAC is re-examining its credit programs accordingly. Villagers concerned about the misappropriation of "food for work" grains by corrupt officials inspired a study on corruption. BRAC staff members started recording reports from villagers. Adding data gathered from official records, BRAC workers and the villagers determined exactly how much each individual was taking and how. When Union Councils and Thana officials were presented with these facts, "food for work" grains suddenly became available to the poor for their projects.

BRAC's responsive style of programming has emerged within the framework of well developed management systems designed to facilitate decentralized operation within a strong but evolving policy framework. Abed's leadership style encourages open discussion of difficult issues and acceptance of apparent errors, yet provides firm decisions when they are needed. Continually investing in development of new skills and methodologies, BRAC sends its personnel into the village armed with a good deal more than high ideals. The spontaneous replication BRAC is observing is probably the strongest available indicator that its program is truly meeting felt needs, yet BRAC faces some important challenges. Powerful social forces toward positive changes have been set in motion by the BRAC approach, and maintaining the momentum of those forces without incurring a major backlash poses a difficult challenge.

4. Philippine National Irrigation Administration (NIA) Communal Irrigation Program. Government assistance to small farmer-owned and operated gravity irrigation systems in the Philippines traces back to the early 1900s, but it was generally limited to the construction of physical facilities. Especially during the 1950s and 60s it was dominated by "pork barrel" politics which spread available funds over so many different projects that planning and construction were often inadequate. In the early 1970s efforts were made to correct the deficiencies of the past, but even with more rational allocation of funds many completed systems fell rapidly into disuse or served substantially fewer farmers than intended. One theory argued that attention was needed to help the farmers form effective associations able to perform the operations and maintenance tasks once construction was completed.

Two actions were taken in 1976 by the NIA, which was responsible for overall irrigation development in the Philippines. One was to conclude an agreement with the Farm Systems Development Corporation (FSDC), a public corporation with experience in developing small pump-fed irrigation systems, under which FSDC would organize farmers to operate and maintain many of the physical systems which the NIA was constructing. The second action was to initiate a pilot project at Laur in Central Luzon to experiment with a more integrated approach in which the capacity of the water-user association would be developed through active involvement in the planning and construction activities: planning system layout, obtaining water rights and rights of way, organizing volunteer labor inputs to system construction, and exerting control over project expenditures.

Integrating social and technical development proved extremely difficult. In one community it was learned how difficult dealing with local power struggles can be--leading to the abandonment of construction plans until the local association reorganized itself some two years later. In a second community it was learned that a high level of commitment from a cohesive farmer group does not necessarily make things easier for the engineers: scheduling and system design issues resulted in numerous delays and changes; organization of volunteer labor presented unfamiliar problems worked out only through lengthy meetings; and farmer insistence on monitoring purchases and limiting personal use of vehicles using gasoline charged to the farmers' loan accounts was not always welcomed by project engineers. The farmers even questioned the engineers on basic technical judgments, such as the type of material chosen for dam construction, insisting that the proposed structure would not withstand the force of local floods. Finally, however, the new dam was completed using the design favored by NIA's design engineers--only to be washed out a few months later.

That experience was sobering in the difficulties which it suggested the NIA must face if it were to work effectively in support of community-managed irrigation; its capabilities on both the technical and the institutional side would need to be upgraded. Numerous changes in operating procedures were implied. Yet, it established in the minds of NIA's leadership that there were major benefits to be gained in return. Not only could farmer participation in system planning and construction result in a stronger water-user association better equipped to operate and maintain the finished system, but it could also result in a better designed and constructed irrigation system more likely to meet farmer needs.

Though still unfolding, the NIA experience is of special interest in providing a model of organizational change by which a large, established, bureaucratic, technology-based, public organization may be able to redesign its programs and structures through a bottom-up, field-based, learning process analogous to that by which the successful programs of organizations such as the National Dairy Development Board and the Bangladesh Rural Advicement Committee emerged. The NIA model has the following key elements.

- *A Series of Time-Phased Learning Laboratories.* Initially two NIA communal assistance projects were designated as learning laboratories in which teams of NIA personnel: (a) worked out methods for integrating the social and technical aspects of full involvement of farmers in planning and construction; (b) built an understanding of the special problems posed by these methods and of the capacities NIA would require to use them effectively; (c) built a cadre of engineers, organizers, and managers skilled in these methods to facilitate dissemination to the rest of the organization; and (d) identified conflicts between the new methods and the policies and procedures of the NIA. Assessment of the projects was used to refine methods subsequently employed in two additional pilot systems, also designated as learning laboratories. These refinements made it possible to shorten lead times, reduce the number of organizers required, improve project site selection, and avoid many of the conflicts between farmers, engineers, and organizers encountered earlier.

- *A National Communal Irrigation Committee.* A top level working committee, headed by NIA Assistant Administrator Benjamin Bagadion who is the moving force behind the communal effort, coordinates the learning process. Committee membership includes central level NIA officials and an FSDC representative, as well as academically based members representing the disciplines of social science, management, and agricultural engineering. Meetings are held monthly to evaluate progress, interpret the experience from the learning laboratory sites and other research, initiate new studies as needed, and plan strategies for phased dissemination of new methods.

- *Process-Oriented Research.* Research is an integral part of the learning process. The focal concern is with building into the NIA the new skills, methods, and systems appropriate to its new participatory approach. The outside researchers include social scientists from the Development Academy of the Philippines, management experts from the Asian Institute of Management, and an agricultural engineering team from the International Rice Research Institute and the University of the Philippines at Los Banos.

- *Seeding Pilots.* When the Communal Irrigation Committee concluded that a reasonably satisfactory program model and supporting methods had been produced in the learning laboratory systems, a workshop was held in December 1979 for the directors of each of the NIA's 12 regions at which an orientation to the new approach was provided. Each was called on to designate one upcoming system rehabilitation in his region as a pilot project. Each region, thus, would be "seeded" with its own learning laboratory, through which regional personnel could gain experience with the new methods and adapt them to their needs.

Work on the first NIA pilot systems had begun in 1976. Three and a half years later the first steps were being taken to seed the larger organization. At least three and a half more years would be required before the new methods would be understood throughout the organization. That seven years may be required for such a change process has important implications, as it extends well beyond the programming cycles of most donors and planning agencies. It requires commitment, patience, and substantial continuity of leadership to confront the difficulties which are encountered on an almost daily basis. These have been present in the NIA, but there still is no assurance that the effort will succeed.

All the pilot systems in which the new approach is being developed received intensive attention from all levels of management and numerous outside experts; the intensity is gradually being reduced, and the details of a phased dissemination process are being worked out with an unusual care.

Social Intervention As A Learning Process

These cases of relatively promising experience reflect a remarkable diversity. In some, the initiative came from government; in others it was private, or mixed. Some originated in national policy, while others emerged from the bottom up, as a local effort was built into a program with international visibility. Some dealt with a relatively narrow concern such as milk production or irrigation, while others took a comprehensive approach to the needs of given village communities. Some involved specific commitment to the poor while others made no distinction between rural classes.

Achieving fit: blueprint versus learning process. Apparently the determinants of success cannot be found in an easily replicable program variable--whether private or public, multi-purpose or single-purpose, broadly or narrowly defined target group. Each project was successful because it had worked out a program model responsive to its beneficiary needs at a particular time and place, and each had built a strong organization capable of making the program work. But another way, they had achieved a high degree of *fit* between program design, beneficiary needs, and the capacities of the assisting organization.

Between the intended *beneficiaries* and the *program*, the critical fit to be achieved is between beneficiary needs and the particular resources, and services made available to the community as program outputs. Beneficiary needs, of course, are a function of the political, economic, and social context in which the beneficiaries live, and they cannot be adequately defined for determining program input requirements independently of that context.

Between *beneficiaries* and the existing *organization*, the critical fit is between the means by which beneficiaries are able to define and communicate their needs, and the processes by which the organization makes decisions. This may require changes both at the community level--developing a way for the poor to express their needs--and the assisting organization's level--developing ways for the organization to respond to such information. The way in which this fit is achieved will largely determine whether the intervention builds or diminishes the community's capacity for local problem solving.

Between the *program* and the *organization*, the critical fit is between the task requirements of the program and the distinctive competence of the organization. The task requirements consist of whatever the organization's members must do to produce the appropriate inputs and make them available to the beneficiaries. The distinctive competence of the organization relates to the structures, routines, and norms which govern the organization's functioning and the technical and social capabilities it brings to bear in providing the program.

The specific ways the four programs had found for fitting these elements together varied substantially, and each was probably unique to a particular time and set of circumstances. The commonalities that may be looked to as providing important lessons are not found in their final program or organizational blueprints, but rather in the process by which both program and organization were developed concurrently. These experiences help to illuminate why effective fit is so seldom achieved in rural development efforts through the prevailing *blueprint* approach to development programming. Their comparative success was based on a rather different process of bottom-up program and organizational development, a *learning process* approach.

The blueprint approach. The textbook version of how development programming is supposed to work is labelled the blueprint approach in recognition of its emphasis on careful pre-planning. Researchers are supposed to provide data from pilot projects and other studies which will allow the planners to choose the most cost-effective project design for achieving a given development outcome and to reduce it to a blueprint for implementation. Administrators of the implementing organization are supposed to execute the project plan faithfully, much as a contractor would follow construction blueprints, specifications, and schedules. An evaluation researcher is supposed to measure actual changes in the target population and report actual versus planned changes to the planners at the end of the project cycle so that the blueprints can be revised.

The project--its identification, formulation, design, appraisal, selection, organization, implementation, supervision, termination, and evaluation--is treated as the basic unit of development action. Its distinguishing characteristics have been summarized as follows:

> A *project* . . . has *definite goals, a definite time-frame,* and a *careful specification of resource requirements* . . .. Project goals take many forms, but they all have one common feature: they are terminal. Reaching the goal concludes the project. (Emphasis in original).

The blueprint approach has an appealing sense of order, specialization, and recognition of the superordinate role of the intellectual which makes it easily defensible in budget presentations. Indeed, its emphasis on well-planned and clearly defined projects with discrete and visible outcomes is well suited to the construction of a large-scale, physical infrastructure where the task *is* defined, the outcomes terminal, the environment stable, and the costs predictable. However, in rural development objectives are more often multiple, ill-defined and subject to negotiated change, task requirements unclear, outcomes unbounded by time, environments unstable, and costs unpredictable.

Where knowledge is nearly non-existent, the blueprint approach calls for behaving as if knowledge were nearly perfect. Where the need is to build capacity for sustained development action, it assumes that development actions are terminal, and that temporary organizations will suffice. Where the need is for a close integration of knowledge building, decision-making, and action-taking roles, it sharply differentiates the functions and even the institutional locations of the researcher, the planner, and the administrator. While awareness is becoming widespread that the blueprint approach is an inadequate response to the rural development problem, its assumptions and procedures continue to dominate most rural development programming and to provide the core content of most development management training. This situation probably will continue until greater attention is given to the explication of viable options.

The learning process approach. Examination of the Asian success cases suggests that the blueprint approach never played more than an incidental role in their development. These four programs were not designed and implemented--rather they emerged out of a learning process in which villagers and program personnel shared their knowledge and resources to create a program which achieved a fit between needs and capacities of the beneficiaries and those of the outsiders who were providing the assistance. Leadership and teamwork, rather than blueprints, were the key elements. Often the individuals who emerged as the central figures were involved at the very initial stage in this village experience, learning at first hand the nature of beneficiary needs and what was required to address them effectively. As progress was made in dealing with the problem of fit between beneficiary and program, attention was given either to building a supporting organization around the requirements of the program, or to adapting the capabilities of an existing organization to fit those requirements. Both program and organization emerged out of a learning process in which research and action were integrally linked.

The National Dairy Development Board (NDDB) is perhaps a prototype of this bottom-up program and organization-building process. The outlines of the model were worked out largely by a group of small village dairy producers to meet their own needs. The young Kurien brought technical and marketing skills, and out of their collective knowledge and commitment a strong supporting infrastructure was fashioned, eventually resulting in an official program of national scope.

The program of the Bangladesh Rural Advancement Committee (BRAC) moved rapidly through three distinct phases as it learned from its early errors. In the first stage it largely acted for the people, in the second the people were drawn into participation in BRAC-defined programs, and in the third it organized the people and responded in support of their initiatives. Organizational strength built through the experience of the earlier phases made possible the third phase in which an unusually high degree of fit was achieved. Researcher, villager, and outreach worker all engaged directly in the process of building and using the knowledge base for improved program design. The result proved so powerful in its response to felt needs that a process of spontaneous replication was set in motion.

The Sarvodaya Shramadana Movement (SSM) offers a variation on the three stages of BRAC's development, though growth was faster and the fit was weaker. It began as an effort to (1) provide school boys with an experience which would raise their consciousness regarding the life of poor villagers, and (2) help break down the social barriers which isolated Sri Lanka's most discriminated castes. This early experience, in which its leadership was shaped, consisted primarily of sponsoring short work-study camps. At this stage there was a fairly good fit between the needs of the school boys, the program, and the supporting organization. But as the Sarvodaya leaders became more sensitized to the needs of the rural poor, they realized the need for more sustained development action. A substantial shift was made in program focus, but with too little attention to implementational details prior to the creation of a substantially expanded organization to enlarge program coverage. The result was a highly centralized and ill-defined organizational structure which fit poorly with program requirements and had inadequate mechanisms for relating to beneficiary demands, while isolating its leadership from contact with operating realities. Recognizing these deficiencies after several years, a research mechanism was eventually introduced to facilitate feedback and corrective action through involving villagers and staff in collecting, assessing, and acting on program performance data.

The National Irrigation Administration's (NIA) new participatory style communal program was still at an early stage of development, but it illustrates an explicit effort to simulate within a large established organization the type of bottom-up program design and organization-building process of the NDDB and BRAC experiences. NIA personnel first worked with village people to evolve a more suitable program model, and then they gradually worked to build into the larger NIA organization the capabilities needed to achieve a fit with the new program model's task requirements. This included a variety of training seminars, replication of the pilot project learning experiences, additions of new types of personnel such as community organizers, and changes in organizational structures and procedures.

The Learning Organization

Achieving fit through the learning process approach calls for organizations that have little in common with the implementing organizations geared to reliable adherence to detailed plans and precedents that are favored in the blueprint approach. Its requirement is for organizations with a well developed capacity for responsive and anticipatory adaptation--organizations that: (a) embrace error; (b) plan with the people; and (c) link knowledge building with action.

Embracing error. Preplanned interventions into varied and constantly changing socio-technical systems will nearly always prove to be in error by some margin in terms of producing the effect intended. The response to this error is one of the best available indicators of the quality of an organization's leadership. There are three characteristic responses to error: to deny it, to externalize it, or to embrace it. Every individual has some tendencies toward each. Organizations develop norms reinforcing one or another tendency until it becomes a dominant characteristic.

The dominant response in the *self-deceiving organization* is to deny error. If top management treats error as an indication of personal incompetence, the organization's members will rapidly become highly skilled in making sure that errors are hidden. This can be quite reassuring to those removed from operating reality as it confirms their self-image as competent leaders. They can impress visitors with polished briefings, fully confident that their centrally planned and administered program is achieving the intended impact on the beneficiaries. While such briefings can impress the unwary, the claim that a program is working exactly as originally planned is an almost sure sign to the alert observer that the organization suffers from a serious information blockage that is hiding errors and preventing learning. A trip to the field is likely to reveal a largely inoperative program, able to accomplish little more than completion of the forms on which accomplishments are reported. Where exceptions are found they will normally involve an unusually strong individual with a good sense of his or her community, who has taken the initiative in working out a new program which achieves a fit with beneficiary needs but which looks rather different than the one prescribed by program norms, and is achieved in spite of, rather than because of the larger organization.

The *defeated organization* typically portrays a rather different public image, although its operating reality may closely resemble that of the self-deceiving organization. Its members speak openly and in rich detail of their organization's errors by way of pointing out how impossible their task is, given the perversity of an environment which does not respond according to their wishes--they externalize the source of the error. Thus, error becomes impotence. As individuals reinforce each others' perceptions, they may come to feel so totally overcome by circumstances beyond their control that they do nothing--except to report their problems to higher management in the hope that someone will do something. But each level feels similarly defeated and only passes the problem on for attention by still higher authority. The lack of action further contributes to impotence and demoralization.

The *learning organization* embraces error. Aware of the limitations of their knowledge, members of this type of organization look on error as a vital source of data for making adjustments to achieve a better fit with beneficiary needs. An organization in which such learning is valued is characterized by the candor and practical sophistication with which its members discuss their own errors, what they have learned from them, and the corrective actions they are attempting. Intellectual integrity is combined with a sense of vitality and purpose. Such a climate in an organization is an almost certain indication of effective leadership.

Planning with the people. Rural people have a great deal to contribute to program design. They have a substantial capacity for learning and change, but they also have good reason to be skeptical of the stranger bearing ideas for improving their lives untested in their setting. The history of rural development efforts bears testament to the wisdom of their caution. One of numerous weaknesses of centrally designed programs is that planners proceed as if they were writing on a clean slate, possessing all the knowledge relevant to improving the villagers' life. In reality they are making interventions into well-established socio-technical systems within which the poor have, over many years, worked out appropriate methods to meet their basic survival needs--otherwise they would not still be around. Sometimes they have come to terms with harsh trade-offs, as in the case of Indian hill tribes that have learned to plant low yielding, early maturing grains rather than face the increased risk of death from starvation while waiting for the higher yielding varieties to mature. Such knowledge, crucial to any effort by outsiders to improve the well-being of the rural poor, is possessed by the people, but easily overlooked by planners who have not had--or do not seek--the opportunity to ask.

Building on what the people already know and the resources they already possess has numerous advantages. The adjustments required from them are more easily made and the risks of imposing new methods unsuited to their needs are substantially reduced. Also, indigenous technologies are usually within the control of the community. Building on, rather than replacing those technologies reduces the likelihood that the program intervention will "de-skill" the villagers and, thus, increase their dependence on external experts and suppliers over whom they have no control. The successful programs involved substantial planning with the people, especially in their early stages in which the basic program models were developed. Generally, they built from and enhanced community capabilities while opening new options.

Where outside dependence was involved, as to some extent it almost inevitably was, efforts were made to reduce the attendant risks.

Linking knowledge to action. The blueprint approach commonly assumes that the knowledge required for the preparation of program designs can be generated independently of the organizational capacity required for its utilization. This is reflected in its sharp differentiation between the roles of researcher, planner, and administrator --often assumed to be from different organizations--which inevitably separates knowledge from decision and from action. Those persons in day-to-day contact with the community reality and organizational function --the administrators, the field operations personnel, and the villagers--have no defined role in the definition of needs or the making of program design decisions. The decision-making role is assigned, instead, to the individuals furthest removed from the relevant data--the professional planners.

Such separation is not found in the success cases examined. Especially in the early stages all three roles were combined in a single individual or a close knit team. Even as the organizations grew, the mode of operation stressed their integration. Researchers worked hand-in-hand with operating personnel, planning was done by those responsible for implementation, and top management spent substantial time in the field keeping in contact with operating reality. The process of rapid, creative adaptation, essential to achieving and sustaining the fit on which effective performance depends, virtually demands such integration.

It bears note that the same integration of roles is characteristic of the more successful pilot projects undertaken to provide design inputs to professional planners, although its significance is seldom noted. Unfortunately, their resemblance to the early field experiences on which major successful programs have been built ends there. Carried out as research studies, they are typically under the direction of a special research team. After a predetermined time the project team is disbanded and its leaders return to the university to analyze and publish their data, assuming that the final blueprint was the key to whatever results were obtained. What remains is an idea reduced to paper, while the operating organization--the vibrant social organism which encompassed the skills, commitment, knowledge and systems required to give the idea life and adapt it to local circumstances as required--has been discarded.

In fact, the effectiveness of a given program design is at least as dependent on the presence of an organization with a well developed capacity to make it work as it is on the specifics of the design itself. This is an important reason why pilot project results produced by one organization are seldom replicated by another. The blueprint approach implicitly assumes that any lack of fit between the task requirements of the program design and the capabilities of the organization eventually chosen to implement it can readily be corrected through short term training and possibly the introduction of new categories of personnel such as village level workers at the bottom of an existing structure. Seldom is attention given to the implications for higher organizational levels; so the new workers may find themselves required to conform to inappropriate procedures and dependent on unresponsive support systems which leave them unable to accomplish the tasks expected of them.

By contrast, the NDDB, BRAC, and SSM were all organizations built up from the teams that created the original program. The functioning program *and* the organizational capacity to actuate it were both preserved in living form and both continued to evolve in response to further experience and the demands of expansion. In the NIA case, the field-based learning laboratories were sponsored by and under the operational control of the agency that intended to use the knowledge gained. These laboratories were designed not only to produce a program model, but also gradually to build the experience within the broader organization required to make it work. Where researchers were involved, they were in supporting rather than controlling roles.

In each instance the operating methods that were developed in the early stages were gradually translated into supportive management systems. The individuals who had created and sustained the fit were assigned to guide the learning experiences of others until they too gained the knowledge, commitment, and skills to make the program work. As the program moved into new communities, new lessons were learned, including lessons on how to maintain the fit between program and people as the organization expanded. New knowledge and the organizational capacity to put it to work were created simultaneously by one and the same process.

Conclusion: A Need for Action-Based Capacity Building

The concepts and methods of the blueprint approach may be more of a hindrance than an aid in the programming of effective rural development action where the need is for an adaptive, bottom-up process of program and organizational development through which an adequate fit may be achieved between beneficiary needs, program outputs, and organizational competence. This calls, not for more sophisticated skills in the preparation of detailed project plans, but rather for skills in building capacities for action through action.

Of course, just as very few centrally planned rural development programs achieve the three-way fit required for effective performance, few of the many village-based development efforts which do achieve fit on a local basis ever develop into capacities for sustained action on a significant scale. Perhaps they lack a strategy for progressing successively through the three basic stages: 1) learning to be relevant,

2) learning to be efficient, and 3) learning to expand. Even if they have become relevant to beneficiary needs they may not have gone beyond this stage to articulate answers to such questions as: Why were we successful in this instance? To what extent was the outcome context-dependent? What lessons might have broader application? And, of course, even if they did progress through to the efficiency of Stage 2, perhaps they could not or did not want to expand in Stage 3. Where the sequence most often stops, and why, is an important question deserving careful examination. Perhaps a clearer vision of the learning process approach as a basis for formulating program and organizational development strategies would, in itself, facilitate removal of the blockage in organizations with potential for further development.

Greater understanding of the requirements of the learning process approach on the part of sponsoring and operating agencies may be of particular importance. For example, a portion of rural development funding portfolios might be programmed not around sectors, but around individuals with the leadership qualities, the ideas, and the commitment to advancing the cause of rural people from which substantial programs might be built. This could provide the recipient change agents with the flexible funding which might allow them over a period of five to ten years to carry their idea through the three developmental stages to the building of a major mature program. The details for both operating agency and funder would vary substantially depending on purpose, setting, whether government or private, whether a new or an established organization, whether locally or internationally funded. But the essential nature of the process would remain much the same. The constant elements would include the requirements for leadership, demanding intellectual discipline, freedom to deviate from the initial plan and budget, and continuing attention to staff development through action-based learning.

Stage 1 investments, designed to produce knowledge of how to be relevant to key beneficiary needs, would represent very high risks for the funding agency--i.e., they would represent a sort of venture capital commitment. Only 10 to 20 percent of programs funded for Stage 1 might be expected to merit Stage 2 support, especially as the funding agency is itself learning how to spot promising leads and support them in appropriate ways. But if as many as one out of 10 turned out eventually to be a BRAC, an NDDB, or a national agency such as the NIA with a new nation-wide capacity to manage effectively a $100 million-a-year program in a way that worked in support of farmer organization and initiative, it would be a very favorable return on investment, and a substantial improvement over current funding agency performance.

A significant barrier to funding agencies driven by the imperative to move large amounts of money in predetermined times is that a mature program along these lines would not be ready to put large blocks of funding to effective use on a sustained basis until the replication actions of Stage 3. A major funder might well have difficulty placing more than 5 percent of its funds in promising Stage 1 programs in a given year. But to provide the close monitoring required to ensure the availability of appropriate technical and financial support as needed, and to make difficult judgments regarding whether a given effort no longer exhibited sufficient potential to merit continued support, the funding agency would probably have to commit from 10 to 15 percent of its staff to the effort. Thus, it would be for the funder a highly staff-intensive undertaking.

A second barrier is presented by established programming. A demand for detailed preplanning and subsequent adherence to detailed line item budgets, project plans, and implementation schedules would immediately pre-empt the learning process by imposing the demand that leadership of the incipient effort act as if it knew what it was doing before the project began--that is, before there was an opportunity for learning to occur.

Given these and other barriers, including the lack of supporting research and training capacity in management and the social sciences geared to its requirements, action on this proposal presents no small challenge. But the alternative is likely to be a continuing record of failure in the attack on rural poverty, no matter how much money is committed.

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Guiding Research Toward Technologies to Meet Regional Rural Needs

Robert Chambers

[In light of present difficulties in expanding productive activities in rural areas, a new approach to technology may provide some answers. Rather than just letting new technologies take over as they are discovered with whatever consequences may follow for rural areas, technologies designed to solve specified rural problems should be systematically sought in research.]

Rural development is so varied and so complex, involves so many disciplines, and is so lacking in explanatory or prescriptive theory that it is often hard to see the wood for the trees. At one pole, the pedantic data mongering of some academic research leads off into "stamp-collecting" trivia; at the other pole, some practical Philistines indulge in what has been called "the intellectual rigor of almost total ignorance." Pedants and Philistines alike see quite clearly what is very close to them, or think they do, but they see different aspects of the same things; they cannot describe them to one another, and would not listen if they could. The underlying assumption of this article is that a more imaginative and future-oriented approach is needed to rural development in much of the Third World, and that this cannot be achieved if one is anchored either in the snug security of academic particularisms or in the crude pragmatism of the man who thinks only of day-to-day affairs. To those who find the approach fanciful or futile, the challenge is to propose something better.

Our argument originates in near despair at future prospects in many of the rural areas in the Third World, particularly in South Asia. A recent set of projections

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for South Asia gives a rural population of 980 million in 1975 rising to 1,559 million by the year 2000, an increase of 59 percent. This is despite a near-trebling of urban population in the same region in the same period, from 288 million to 825 million. The mind boggles at the prospect, and it is difficult, thinking conventionally, to imagine how acceptable livelihoods can possibly be provided for such numbers of people in the countryside.

The gloom deepens when one considers past failures and future difficulties. Land reform in South Asia has accomplished little. Brave initiatives to reach the poor have been perverted to benefit the better-off. Inflation in food prices has inflicted great but unseen suffering on millions of dispersed and invisible rural people. The green revolution has begun to wilt. Family planning, we are told, will not catch on before there is social and economic progress, and social and economic progress becomes less and less possible as family planning fails to catch on. Revolution, whatever that means, poses as a simple solution but could well generate more suffering than it relieved. Meanwhile, the population continues to grow and prospects become more, not less, daunting.

Pessimism has been in fashion; but views of the world situation have their own cycles, and we may currently be starting to rise out of one of the troughs. In sympathy with that rise, I shall argue that there is one major line of attack on the problems of future rural living which remains to be explored as a field for sustained and systematic action. This is the planned specification and development of technologies appropriate for specific future rural environments, working backward from future populations and resource endowments to identify present research and development (R & D) priorities.

Choosing Directions for Technology to Go

The argument is that technologies, once devised and available, are a relatively immutable component in the rural environment, unlike political systems, organizational structures and management procedures. But technologies, as is very well known, have marked income and resource distribution effects. Big, expensive irrigation pumps help big men to appropriate communal groundwater; smaller pumps spread some of the benefits to the smaller men. Modern rice mills employ fewer, more skilled operatives at high wages; traditional rice hullers employ more less-skilled and poorer people at lower wages. Examples do not need to be multiplied for we are considering a commonplace.

What does not seem to be commonplace is following through the implications of this fact into relevant R & D decisions. Income and asset distribution effects can be planned into the R & D which creates new rural technologies; further, the very choice of the technologies to develop can be determined by a view of the sort of society that is desired. This may not be a path to a Brave New World, but it may provide a much surer way of moving toward more acceptable rural societies than either political engineering or administrative reform.

This assertion may go further than the point reached by many who support the "intermediate technology" movement. That movement has been properly engaged in spreading the gospel of developing, improving and transferring appropriate technologies. The approach, as far as it has gone, has been sensible, but it has tended to be piecemeal--bamboo tubewells here, bicycle trailers there--a series of generally intelligent and useful but inadequate initiatives. Moreover, it is in danger of failing to influence the crucial R & D devoted to energy substitutes, the results of which may burst upon the rural Third World in the next two decades. There may at this moment exist a tragic gap between those who perceive the needs of rural societies and those who are creating the technologies that they will come to use, and which will determine much of their form.

Planning Method

The approach advocated here to fill the gap is to plan the R & D. The initial stages and the planning process are these: first, the characteristics of a desirable rural future are specified. This involves values and will always be open to argument, but is an essential step. Second, the anticipated relative endowments of the four prime resources--land, water, energy and people--are assessed for a particular rural environment. The third step is to specify the characteristics of a technology that would link those resource endowments in such a way as to achieve the desired characteristics. Often, perhaps usually, the technology will be found not to exist. The challenge, then, is to create it.

This approach can be illustrated with a set of specifications for rural futures, and with the resource endowments of four rural environments, two in Asia and two in Africa. These concrete examples, better than any abstract argument, will expose some of the strengths and weaknesses of the approach. The presentation is brief and summary, reflecting the early stage of thinking reached so far.

Five desirable characteristics for future rural environments can be proposed.

Stability: the ecological system should be stable. This includes declining or nil uses of nonrenewable resources.

Productivity: The productivity of whatever resources are scarce should be higher rather than lower. Conversely, abundant and renewable resources can be used relatively wastefully.

Livelihood intensity: more, rather than fewer livelihoods should be generated by the system. [This is almost the same as labor intensity.]

Continuity: incomes and food supplies should be generated over more rather than less of the year.

Equity: resources and benefits derived from resources should be distributed more rather than less equally among the population.

Taken together, these five characteristics or criteria are designed to embody a holistic and ecological view of human existence.

These criteria are, however, a value-loaded personal choice. Another list applied to the environments to be described might produce different specifications. This does not invalidate the approach; on the contrary, it demonstrates its versatility.

Example No. 1. In the well-irrigated areas of North Arcot District of Tamil Nadu in south India, water is scarcer than land. The water table is subject to a secular decline, apparently as a result of overextraction by electric and oil pumpsets. There is a vast energy endowment in sunlight, but much less in hydroelectric potential, and forestry does not present a major opportunity for storing energy. Between 1970 and 2000, the rural population is expected to increase by at least three fifths. There is already serious underemployment, with a substantial migrant proletariat.

The technology required must ration water, and must not use nonrenewable energy resources; it must be much more livelihood-intensive in order to sustain more equitably a much larger population; it should encourage much more productive uses of water; and it must enable productive work to be carried out during much of the year. Such a technology might be found in the use of solar energy for lifting water. If this technology were developed so that it was very small scale, had negligible recurrent costs, and had a suitably specified lifting power, it might, once adopted, meet the criteria as follows:

Stability: rationing the groundwater by extracting less and using only renewable energy sources in the form of solar radiation. Increased *productivity* of water might follow through more water-sparing (and labor-intensive) application, adopted because of its scarcity. The *livelihood intensity* of water use might be greater in that there would have to be many more wells, and each well and pump could require one person or family to operate it. *Continuity:* allowing cultivation during most or all of the year with the lesser amounts of water made available from wells. *Equity:* through the sinking of many more wells, necessary because of the small scale of the technology, setting the scene for a redistributive reform through an eventual policy of "well, pump and land to the irrigator."

Feasible paths toward the adoption of such a technology have been discussed elsewhere, but the technology does not yet exist. In the meantime, R & D work is in hand in several parts of the world (including the United Kingdom, France, the Sahel and India) to develop solar pumps. Unless there is a conscious and powerful planning intervention, it would be a matter of sheer coincidence if any of the solar pumps that are being developed had an appropriate scale, lift power, and other characteristics for a desired future in any part of rural India. The most likely outcome may be, once again, inappropriate technology, which will displace livelihoods, enhance inequity, and inflict yet more misery into rural lives.

Example No. 2. The Himalayan foothills have a very different endowment of the four resources. Land for stable cultivation is very limited; considerable areas of land are suitable only for forestry or the growth of tree crops. The rainfall is high and abundant water is available in rivers in valley bottoms. There is a vast hydroelectric energy potential. At existing levels of technology and economy, the population is reducing the potential of the land through erosion from cultivating steep slopes; and the population can be expected to increase.

For this environment, the technology that can be suggested is a livelihood- and energy-intensive method for processing trees, tree crops and vegetation. If the main organic raw materials are lignin and cellulose, then the question arises as to what uses they can be put, and in what ways they may be processed to result in a usable product. An energy-intensive process for converting lignin or cellulose into carbohydrates or other food, whether for human or animal feed, appears an obvious possibility. The danger is that, unless there is deliberate intervention at the R & D stage, which is probably already in hand, the technology developed will be capital-intensive and labor-sparing. The capital intensity may not be so very serious a problem, but a labor-sparing technology would be inappropriate. The implication is that, as with the North Arcot case, the R & D itself has to be deliberately designed to meet the specifications of the future environment.

Example No. 3. Eastern Sudan presents a sharp contrast with the two previous cases. Land is abundant. Water is limiting. The rainfall is concentrated in a few months, and in the areas with which we are concerned irrigation is not feasible. There is a vast energy endowment from sunlight. The population is low in relation to the land. The current system is inefficient in terms of continuity and stability. Agricultural activities are crammed into a short period. Plowing is carried out by tractors working 24 hours a day in order to catch the rains. Weeding and (even more so) harvesting present critical labor demands, which are met by importing casual labor from far afield. Continuity of employment is very low as a result of this peak; and stability is poor in that large amounts of fossil fuels are consumed by the tractors.

For this environment the technology required is one that will combine continuous employment with storing solar energy, and using that stored energy for cultivation and perhaps also for weeding and harvesting. It is possible to envisage a situation in eastern Sudan in which some people make their living through small-scale energy storage from solar radiation, and either sell that stored energy to others or use it for their turn with a communal solar-energy-powered tractor. Much R & D work may be in hand for the storage of solar energy. It is to be wondered, though, whether the livelihood intensity of the finished technology will ever have crossed the minds of the researchers as a design criterion.

Example No. 4. Western Tanzania is yet another contrasting environment. Land is abundant and population scant. There are vast extents of wooded bushland uncultivated and unexploited by man. Water is largely limited to a moderate rainfall. The solar energy received is huge and some of it is stored naturally in the bush. The hoe is used in a shifting cultivation.

The scarcest resource is labor and the most abundant, land. Appropriate technologies here might center on the use of the bush for energy, treating much of the area as an energy farm. Charcoal burning is a novelty among officially sponsored rural activities, but much practiced already as a form of energy farming. The technologies required include more labor-extensive techniques for charcoal burning, and vehicles, including tractors, that operate on charcoal. It is arguable whether Tanzania as a whole should convert its public transport to charcoal; but for this specific area charcoal might provide the appropriate energy source for more labor-sparing agriculture.

Some objections. The specifications of these four technologies--small-scale solar pumps for North Arcot, energy- and labor-intensive uses for wood and vegetation in the Himalayan foothills, livelihood-intensive storage of solar energy in eastern Sudan, and labor-sparing charcoal burning and charcoal locomotion for western Tanzania--are vulnerable to objections. There may be technical and economic reasons why such technologies will or would prove nonviable. With the exception of charcoal locomotion, they do not exist in a developed form. There may be inherent characteristics in the physical processes that rule out some or all of the desirable characteristics. But none of these objections invalidates the approach. It takes very little time and not much imagination to reach this stage of specification. That the approach can yield specifications in all four of the environments suggest that it may be very widely applicable.

Implications

To take the approach much further requires a special input of manpower and planning. Vigorous exploration of its potential might involve mobilizing professionals competent both in technical aspects and in rural development; a rapid development of long-range environment-specific planning for rural areas carried out by imaginative specialists in the countries concerned; the creation of R & D capability to develop technologies on which work is not currently in hand; a major application of funds from whatever sources to modify R & D so as to ensure that the technologies that emerge are appropriate for the rural environments of the Third World.

The urgency of such initiatives lies in the preemption of choice that can take place in the early stages of R & D. In the words of a recent report, "A social policy should be built into the new technology beginning with the basic research itself." Most of the R & D concerned is probably taking place in the richer countries. The great danger is that once again the technologies that come out, far from being designed to improve life in rural environments, will make it worse--that they will be capital-intensive, large-scale and livelihood-displacing. It is difficult to see how this can be avoided, at least in the energy-substitutes field, without a major and rather high-powered effort. A first step might be to create a mobile and well-informed task force with established worldwide contacts and communication.

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Top-Down and Bottom-Up Rural Planning in South Korea

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[This article outlines, first, the highly successful "top-down" rural development program of the Korean government; and second, a group of projects intended to establish "bottom-up" decision processes, supported by a foreign private agency, also with successful results. In conclusion, some lessons from experience are analyzed.]

South Korea has a land area of about 98,500 square kilometers and a population of about 37,000,000, making it one of the most densely populated countries in the world (374 persons per square kilometer). Less than 25 percent of the land area is arable, so the actual concentration of people, even in rural areas, is much greater. Because winters are fairly cold and dry, double cropping is only possible in the southernmost provinces. However, winter vegetable growing in vinyl greenhouses has been widely adopted in recent years.

In the 1960s and 1970s South Korea has undergone an extraordinarily rapid rate of industrialization, urbanization and economic growth. Starting from a predominantly agrarian society, its urban population rose from 28 percent of the total population in 1960 to nearly 55 percent at present, with a corresponding decline in the rural population. The Gross Domestic Product (measured in constant prices) grew at an average annual rate of 8.5 percent between 1960 and 1970, and 10.3 percent from 1970 to 1976. Per capita real income rose at an average annual rate of 7.3 percent from 1960 to 1976, reaching an average of US$670 per person in 1976.

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Despite an absolute decline in the agrarian population (due to rapid urban migration and an increasingly effective birth control program), agricultural output grew at an average annual rate of 4.5 percent from 1960 to 1970, and 4.8 percent from 1970 to 1976. At present there is an actual shortage of agricultural labor in South Korea--an unusual phenomenon in Asia.

In contrast to most other Asian developing countries, the distribution of wealth in South Korea is fairly equitable, comparable to that in the United States. This is in large part a result of measures that raised the position of farmers, who are in developing countries the poorest members of society. A thoroughgoing land reform program was carried out in 1949/50. As a result, while over 83 percent of farm families depended to a greater or lesser extent on landlords in 1947, in 1964 (after the reform) the figure had dropped to about 30 percent. During this same period the percentage of completely landless households in the farm population fell from more than 45 percent to about 7 percent.

As noted above, the pace of agricultural production picked up in the early 1970s. Grain production since 1973 has increased at a rate of about 7 percent annually, mainly due to the successful adaptation of new varieties of rice and barley to Korean soils and climate. Urban and export demand for agricultural products, particularly cash crops such as fresh vegetables, fruit, and meat, stimulated even greater increases in productivity in some of these crops. While demand is, of course, an essential stimulus, the rise in farm production has only been possible because more fertilizer and pesticides, improved irrigation systems, greatly increased amounts of rural credit, and improved technical knowledge have been made available in recent years.

Increased productivity and rising prices for agricultural products have improved farm income and the farmers' terms of trade. Better transportation, rural electrification and a rapid expansion in educational facilities have also contributed to the rising quality of rural life. In sum, there has been since 1971 a real transformation in rural living standards with average farm household income reaching almost that of urban workers. Development is the main preoccupation of most Koreans today. In rural areas new crops, new agricultural methods, and dramatic improvements in social infrastructure are characteristic of most villages.

The *Saemaul Undong* Program

While the economist tends to see the causes of this rural economic growth and social transformation in such factors as market incentives, improved seed varieties, and the greater availability of agricultural raw materials and services to the farmer, the Korean Government attributes most of the recent progress to the successful implementation, starting in 1971, of its *Saemaul Undong* (New Community Movement). Although the main focus of the New Community Movement has been rural development, it also has another dimension--the fostering of a new ideology.

In recent years social commentators as well as political scientists have deplored the lack of a genuine national ideology in South Korea, maintaining that anti-Communism and the pursuit of material progress were not enough to provide inspiration as national goals and symbols. By 1972 it was apparent that the New Community Movement in its broadest context constituted part of a determined attempt by the Government to fill this ideological gap. The attempt is still being pursued, and strenuous efforts are made to infuse every aspect of life --from garbage collection to poetry writing--with the Saemaul spirit. The Movement adopted "self-help, cooperation, and diligence" as its motto, and President Park's frequently repeated words, "Let's live better," became a kind of slogan. Building on both the hierarchical and collective traditions, the Movement stressed obedience to expert, paternalistic administrative leadership and an extension of the idea of community to encompass the entire nation. The ideological component was, of course, closely related to the Park Government's objective of expanding and consolidating grassroots political support.

By the winter of 1971-1972 a major effort had been launched to get the majority of farmers in all 35,000 South Korean villages involved in cooperative village improvement projects. Supplies of cement and steel reinforcing rods were made available by the authorities, and villages were encouraged to use them to improve roads, bridges, wells and sanitation facilities. A major program was also launched simultaneously to persuade farmers to replace their thatched roofs with tile, metal or composition. The expectation was that through participation in projects having an immediate impact on the village environment, farmers would realize the benefits of working together during the off season, and a spirit of progressive community activism would be fostered.

Because of unrelenting pressure from the top, bureaucratic efforts to achieve the movement's goals were intense. Saemaul became the main focus of activity for all local administrative agencies, and thousands of other officials from the capital descended on the provinces to inspect, exhort, direct operations, and, to some extent, compete with local officials. The result initially was often confusion and bureaucratic overkill, while the astonished villagers struggled to comply with mounting and sometimes conflicting demands for compliance with various aspects of the overall plan.

In the beginning most farmers distrusted the motives of officials and resented their constant interference in village affairs. After all, nothing good had ever happened to rural society before as a result of closer contacts with the bureaucracy. Where villagers were slow or reluctant to organize for carrying out suggested projects, official pressures were applied that often amounted to direct coercion. For example, if several farmers in a village were reluctant to replace the traditional brush fences around their houses with cement walls, jeep-loads of men from the county seat might arrive and simply tear them down. Similarly, there were occasions when house owners who were unwilling to make the substantial investment necessary to replace their thatched roofs with composition or tile might return home from a market trip to find the thatch gone and their homes open to the sky. Such excesses, which reflected the concern of local officials with producing quick results to please superiors, generated a lot of resentment and cynicism during the first two or three years of the movement.

But since 1973 attitudes in most places have gradually shifted, as farmers discovered that all the excitement and effort did, in fact, result in substantial benefits. Each village is given a rating by the county chief in accordance with its accomplishments, and local pride has in many cases been stimulated to a high competitive pitch among neighboring communities. Where village leadership is in the hands of determined activists who are also skillful in maintaining good relations with other members of the community, a considerable degree of constructive enthusiasm has usually been generated and sustained. Once the most influential men in a village are committed to pursuing the Movement's goals, others will nearly always follow, and non-conformists are subjected to subtle but extremely effective social censure. As a result, although distrust and reluctance prevailed a few years ago, most village councils are now eagerly drawing up ambitious development plans and begging for official support to help carry them out.

There is a good deal of variation from one village to another, and while some degree of participation exists everywhere, such factors as the quality of leadership, geographic accessibility, the degree of village cohesion (or conversely, of internal division, usually along kinship boundaries), the distribution of wealth, and commercial opportunities for individual profit, all vary from place to place, and all affect the extent and intensity of involvement in collective community efforts. Nevertheless, in spite of uneven performance, it is undeniable that the Saemaul movement has transformed the appearance of Korean villages, fostered the successful completion of a large variety of cooperative, self-help projects, and promoted more effective working relationships, both among farmers and between farmers and local officials. It has also given villagers a sense of participation in a momentous national effort, with strongly patriotic overtones. Any visitor to rural Korea today can observe the pride in recent achievements and a confidence in the future that were almost entirely absent ten years ago.

The government's claim that it is the New Community Movement that is responsible for bringing about the new rural prosperity is not entirely convincing. Actually, it has become increasingly difficult to analyze cause and effect in rural development, because the dimensions of the movement as a "nation-building" ideology have been expanded to include everything positive that happens in rural society. It seems clear, however, that it is not so much that Saemaul has sparked rural prosperity, as that it has been pushed in a context of relative rural prosperity that is the result mainly of other factors: 1) the widespread successful adoption of new, high-yielding varieties of rice and to a lesser extent barley; 2) the maintenance of favorable subsidized grain prices by the government; 3) the increased availability of more effective agricultural extension services; 4) the greatly expanded urban market for a wide variety of new cash crops; and 5) improvements in transportation and storage facilities that have made it possible for farmers to engage profitably in commercialized agriculture.

It is in the upgrading of administrative performance by local governmental and semigovernmental agencies and the improvement of institutional linkages and communications between village and city that the Saemaul Movement has probably made its greatest contribution. Pressures from the top to achieve rapid, concrete and dramatically visible results have been so great that in six years the mass of provincial, county and sub-county officials has been forced to change their outlook and working style from that of conservative, self-seeking, formalistic control and *status quo*-oriented bureaucrats to that of relatively enthusiastic activists dedicated to a transformation of the countryside. Their careers have been at stake. The highly centralized authoritarian political system of South Korea has proved to be well adapted for accomplishing this transformation, even though it has never been specifically enunciated as a goal of the Movement.

The Ministry of Home Affairs and its local agencies, the provincial, county and sub-county administrative offices, have generally exercised effective supervision, making sure that the efforts of various other concerned government agencies were integrated in the overall Saemaul Movement. After many years of "fragmented hierarchical programs" South Korea has finally achieved a coordinated administration of rural development policies. The implications for future rural development of such increased local administrative effectiveness are great. In addition there is now a recognition by villagers that technological advice, capital and improved marketing facilities can best be acquired through official channels and the expansion of ties with the national economy. Officials are no longer feared and avoided as in the past, and the social gulf between farmers and bureaucrats has noticeably narrowed.

Some persistent problems remain, however. The poorest farmers and laborers, who have no land or very little land and who make up about 15 to 25 percent of the rural population, are not particularly enthusiastic about the New Community Movement. They complain that while obliged to participate in village public works projects, usually without pay, they receive no benefits comparable to those of landowners whose property is being improved. They must live by their labor, and they insist that "voluntary" collective work is an unfair burden. Also, higher grain prices are of little help to the 40 percent of all farm households whose land holdings are so small that they have little or no marketable surplus.

The long run future of the Movement is somewhat problematic, because of a potential contradiction in values and organizational structure that is inherent in contemporary Korean society. The Movement's success (but not necessarily further rural development) depends on continuing community solidarity and cooperative effort at a time when individualism and materialism, both as personal ideologies and as patterns of economic behavior, are challenging tradition in every social sector. So far, although exceptions exist in most villages (particularly those near urban areas), traditional patterns of interaction reinforced by outside official support for collective organizations and cooperative effort seem to have resisted or contained the divisive effects of commercial individualism.

The CBIRD program to be described below began some two years after the start of the Saemaul Undong, and it has managed to embed itself within the Saemaul Movement, both at the village level and in terms of the local administrative environment. It is not possible to understand the CBIRD method of operation or evaluate its achievements without considering the general context of contemporary rural development in Korea as outlined above.

The CBIRD Concept and Goals

The Save the Children Federation/Community Development Foundation (SCF/CDF) of Westport, Connecticut, U.S.A. has been engaged since 1973 in an innovative, systematic, and highly organized effort to increase rural income and upgrade the quality of village life in South Korea. SCF/CDF, a nonprofit, sectarian, voluntary organization, has appropriately named its Korean program, "Community-Based Integrated Rural Development" (CBIRD). This general idea was first tried out in Korea, and later applied in more modest ways in 17 developing countries.

Save the Children Federation began its work in Korea in 1953 by providing aid to war orphans, widows and refugees. After 1957 when SCF established a Korean office of its newly created Community Development Foundation (CDF), its aid in the form of cash and relief goods was increasingly converted to self-help support. In order to increase family productivity, CDF encouraged and assisted farmers in the raising of livestock and the cultivation of cash crop vegetables. For the community as a whole there was support for such public works projects as land reclamation, bridge and reservoir construction, and improved sources of drinking water. From the start SCF/CDF encouraged the maximum amount of local participation and management in its development projects. By 1972 various kinds of assistance--to individuals, to families, and to communities--had been furnished to about 7,000 people in some 400 communities.

In 1972 SCF/CDF decided to consolidate the various programs, focusing its main effort on promoting integrated development in several clusters of cooperating villages that were called "impact areas." In June 1976 SCF/CDF received from the United States Agency for International Development (USAID) a sizeable grant in partial support of the Korea program. Under provisions of the grant CDF was expected "to establish pilot community-based integrated rural development projects as mini-regional (or small area) development management models, with an ultimate goal, over a five year period, of institutionalizing a process that will improve income, health, education, and community institutions and services for low income rural people." There are now six "mini-regional" projects, three island areas and three in the mountainous north central region.

There are three main aspects of the CBIRD concept that, when taken together, distinguish it from most other development efforts:

1) The term, Community Based Integrated Rural Development, represents an attempt to combine the strengths of traditional community development theory and methodology with the advantages of a larger scale, systems-oriented, carefully planned and integrated development strategy.

2) The unit of development or impact area comprises several villages, roughly corresponding to the lowest level of local government administration called the *myon*.

3) The CBIRD program is designed to supplement and be integrated with the *Saemaul Undong* program of the Korean Government.

The general scheme tries to profit from the insights and techniques of the hard-headed economist or systems analyst, while remaining true to basic community development principles. The community development approach has traditionally been people-oriented, with an emphasis on changing values and relationships within a small face-to-face community in order to get things moving. CD practitioners insist that development efforts should be directed at the "felt needs" of a community, and that this can only be achieved by maximizing local participation in decision-making--in the planning and direction of projects. Self help through cooperative effort and the investment of local resources is stressed. And finally there is usually an emphasis on egalitarianism and improving the quality of community life, particularly with regard to the situation of the poor and other deprived groups. The economist's planned approach to rural development, on the other hand, usually involves both capital inputs and direction from outside the local community, in accordance with a large-scale plan that is more concerned with increasing quantifiable measures of production than with such intangibles as human motivation and satisfaction. The plan is formulated on the basis of more or less rigorous surveys and sophisticated economic and technological analyses of problems to be overcome.

The CBIRD concept combines what are regarded as the strengths of both methodologies. At the same time it recognizes that the actual program operation must take place within the political context of a highly centralized, authoritarian bureaucratic administration. The term, "integrated," in the CBIRD title, then, can be taken to mean that a variety of problems at the village level should be attacked simultaneously. In its theoretical formulations SCF/CDF places great emphasis on local decision-making, and self help. The creation of permanent local organizations capable of planning and implementing various kinds of development projects is regarded as just as important as the actual end results achieved by such projects. This process of "bottom-up" decision-making and management is believed to be superior to centrally planned and directed "top-down" systems imposed on farmers by bureaucrats from outside the villages for two principal reasons: 1) it is alleged that only grass roots participation in the entire process can ensure enthusiastic widespread involvement, a correspondence of project goals with locally felt needs, and an equitable distribution of benefits; 2) in the longer term after CDF capital and advisors are no longer available, local initiative and control are necessary in order to ensure that developmental momentum is maintained.

The "development management model" requires that villagers receive various kinds of training in order to be able to survey local needs themselves, assess capabilities, reach reasonable decisions and carry them out effectively. Accordingly the CBIRD projects all involve extensive programs of nonformal education. In addition to courses in leadership, planning, evaluation and agricultural (or fishing) technology, CDF also trains villagers to manage local credit unions and to operate a system of development loans through a revolving fund by which increased farm income is recycled into the local village economy. While it is recognized that increases in productivity and income should probably have priority at the initial stages of a rural development program, CDF tries to attack all the major constraints on improving village life. Health care, nutrition, child care, family planning, sanitation, and social/cultural/recreational activities are as much a part of the overall design as projects designed to increase productivity and incomes. In particular, CDF has stressed that the CBIRD projects are designed primarily to assist the rural poor, with women and children singled out as principal beneficiary groups.

These are all conventional community development goals. What is innovative about the CBIRD program is that it is organized to provide an integrated development approach for larger areas, comprising from six to twenty-one villages with populations of from 2,000 to 9,000 persons. There seem to be two main, interrelated advantages to increasing the size of the impact area: 1) It becomes feasible to undertake more ambitious projects in such sectors as public works, education (both formal and nonformal), and health care where large initial investments in trained personnel and facilities are usually required. Also, there is a much larger local resource base to support such projects, in terms of both labor and material contributions. 2) the "mini-regional" area corresponds roughly to the sub-county *myon*. The fact that the government cooperatives and extension service have local offices at the *myon* level is of great importance. Once a measure of consensus and a willingness to participate in achieving joint goals has been established beyond village boundaries within the impact area, then local leaders can work together with officials in formulating development plans and obtaining additional funding or other kinds of governmental assistance. Close collaboration with governmental administrative agencies and other outside institutions, both public and private, is an integral part of CDF's method in Korea. The integration of village economies with national markets, the introduction of the latest agricultural and fisheries technology, and the inculcation of efficient methods of local planning and financial management, all require close and constant ties with the more modernized sectors of Korean society.

The Implementation Record

The booming prosperity and industrialization of the urban areas and the rapid growth of the Korean economy have created unusually favorable conditions for development in both agriculture and fishing. Villages have been carrying on extensive self-help projects since 1972 within this favorable economic climate and there have been significant increases in living standards and agricultural productivity. Expectations for further progress are high, and there is a general acceptance of the need for innovative change. In contrast to the suspicion and hostility with which officials were regarded in the past, villagers now tend to look to local administrative agencies for advice and material assistance.

Environmental factors, however, vary a great deal. While the CBIRD areas all have considerable potential for development in terms of topography and arable land--or access to marine resources--the inland farming communities have certain advantages over the island fishing areas, at least at this stage. They are more homogeneous, both with regard to kinds of productive activity and the distribution of wealth. They are also more compact, comprising fewer villages, among which transportation is easier. Moreover, CBIRD programs were initiated in the mainland communities several years before the island programs. Some--probably most--of the difficulties encountered in the island projects are attributable to aspects of the physical environment or the lesser amounts of investment. In addition, the unfortunate tradition in Korea of contempt by educated city dwellers for fishermen, whose characteristics are contrasted unfavorably with the sturdy virtues of the farmer, still persists.

The CBIRD program has clearly made substantial progress in implementing its decentralized and leverage-utilizing financial strategy. Cumulative CDF grants to the six rural CBIRD areas through June, 1978 totaled $683,000 (excluding expenditures of the SCF/CDF field office in Seoul). Investments in CBIRD projects by the Government of Korea over the same period somewhat exceeded this amount. Community self-help investments and contributions of materials and labor totaled an estimated $1,500,000. (This figure, particularly the portion relating to contributed labor, is only a rough approximation and could be somewhat inflated.) Thus it appears that, overall, each CDF dollar has been matched by four to five dollars of local effort and government funds. These figures do not mean, of course, that in the absence of CDF grants and the CBIRD program none of the other investments would have been made. There is good reason to believe, however, that the CDF funds primed the pump for considerably larger efforts by others--especially the communities themselves--than would otherwise have occurred.

The impressive local effort shown above is partly explained by the fact that 40 percent of the CDF grant funds were recycled back into the local economy as loan assets (controlled by the Community Committees), against which local people can borrow for their own private productive and household improvement projects. An additional 34 percent went into physical property and facilities (e.g., the Community Centers) vested in the Community Committees. These growing assets, summarized for the six areas in Table 1, have given the Committees an increasingly stronger base of authority and viability. We can reasonably conclude from the above evidence that CDF's financing strategy, calculated to produce a multiplier effect on total investment funds for the CBIRD approach after CDF's withdrawal, has been quite successful.

It is instructive to compare the FY 1978 record of one of the early mainland CBIRD areas, Chunsong, and one of the later island areas, Yaksan, in terms of their mix of planned projects and the extent to which they were implemented.

TABLE 1

Community Assets Created by CDF Grants as of 1978 (in U.S. dollars)

	CDF Grants	Community Committee Property	Revolving Fund Loan Assets
Sanbuk	165,135	78,703	70,157
Yanggu	167,131	66,112	56,694
Chunsong	125,042	63,027	48,422
Wido	74,552	--	29,823
Yaksan	76,639	6,570	36,417
Jeungdo	74,224	17,671	42,931
Totals	683,323	232,083	284,544

Chunsong. The projects planned for the Chunsong area for FY 1978 and the extent to which they were actually implemented are shown in the first two columns of Table 2. The next three columns show the relative investment of CDF, Community, and Government funds in each project. Out of a total investment of $94,800, CDF grants accounted for $29,400; community effort $53,400; and Government contribution $12,000.

The annual plan as depicted in Table 2 originally provided for six productivity/income-raising projects and five social infrastructure projects. Two important modifications were later made, however. The project for building 20 tobacco drying houses was dropped because, even though local farmers had been heavily and profitably engaged in tobacco growing, increased problems with plant disease and falling prices convinced them that other crops would be more profitable in the long run. Hence, some of the funds earmarked for the tobacco houses were redeployed to irrigation pumps to counter the adverse impact of the 1978 drought on cash crops. The striking fact is that, according to the year-end report to CDF, all the remaining 10 projects (except for Health and Sanitation) achieved or exceeded their planned targets during the year--an impressive record.

TABLE 2

Implementation Record of Chinsong CBIRD Projects FY 1977-78

Projects	No. of Projects		Actual Investments (US$)		
	Planned	Actual	CDF	Community	ROK Govt.
Tobacco drying houses	20	0[1]	--	--	--
Cows	10	10	4,158.	6,757.	
Cow pen construction	10	15	6,237.	9,356.	
Vinyl greenhouses	10	10	3,534.	6,362.	94.
Community center	ongoing	1 center	2,798.	1,040.	
Leadership training courses	16	16	595.	666.	
Day care centers	ongoing	4 centers	2,524.	4,366.	6,220.
Education & culture	8	10	2,144.	1,331.	
Health & sanitation	4	1	1,247.	7,445.	
Irrigation pumps		19[2]	2,219.	3,169.	561.
Administration			1,341.		
Totals			27,072.	40,492.	6,875.
Locally Supported Projects[3]					
Garlic planting	2 ha	4.2 ha		10,395.	
Truck purchase (co-op)	1 truck	1 truck		2,079.	8,316.
Women's Welfare Bank	1 bank	1 bank		1,206	
Totals			27,072.	54,172.	15,191.

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[1] Cancelled; see explanation in text.

[2] Added; see text for explanation.

[3] Defined as "projects not utilizing SCF/CDF funding but which resulted directly or indirectly from SCF/CDF's assistance or involvement."

The emphasis of the Chunsong program is revealed by the allocation of expenditures. Two-thirds of the total expenditures went into economic projects, principally cattle raising, vinyl greenhouses for cash crops, garlic planting and purchase of a truck, reflecting a strong local preference for income-producing projects. Within the social infrastructure category the largest expenditures were for operating the four existing day care centers for children, a health and sanitation project, and the operation of the Community Center, all of these reflecting CDF priorities. Smaller amounts went to leadership training, education and culture, and administration.

Yaksan. This island area presents a quite different pattern than Chunsong in FY 1978. As shown in Table 3, the plan provided for 10 basically economic projects representing a wide assortment of activities (e.g., animal raising, vinyl greenhouses, growing medical herbs, kelp and seaweed, planting fruit trees, an abalone nursery, and an irrigation channel). The 12 planned social infrastructure projects were equally varied. They included, for example, building a community center, a public bathhouse, a consumer cooperative store, a road and ferryboat landing, kitchen and roof improvements on private homes, school supplies and equipment, athletic and cultural events, health (parasite extermination), and leadership training.

The actual implementation record was considerably poorer than Chunsong's. Of the 21 planned projects only ten met their target, five fell short, and six were delayed or cancelled; but four small unplanned projects were added. In the circumstances, however, this was actually not so bad a record. The CBIRD program in this area, after all, was quite new and the management inexperienced; expected government funds for some important projects failed to materialize; the drought upset certain other projects; competing Saemaul projects diverted funds and energies; market conditions for some agricultural products declined, and popular interest in certain projects evaporated. Despite all these problems a total of $240,000 in cash and in kind was invested during the year, including $39,900 of CDF funds, $75,900 in local resources, and $108,100 in government funds and materials. The largest single expenditure was on re-roofing houses ($24,000); the main agricultural projects together took $35,000, and public works over $11,000. Less than $5,000 was devoted to social welfare. (It is pertinent to note that the population of the Yaksan area is 9,058, compared to 2,108 in Chunsong.)

Some Lessons and Open Questions

Since 1971 the pace of change in virtually all of South Korea's 36,000 villages has picked up dramatically, as village economies have become more and more tightly integrated with that of the nation as a whole, and as bureaucratic influences on almost every aspect of farm

Table 3

Implementation Record of Yaksan CBIRD Projects FY 1977-78

Project	No. of Projects Planned[1]	Actual[1]	Actual Investments (US$)[2] CDF	Community	ROK Govt.
Animal Raising			5,925.	6,996.	
Cows	35	3			
Goats	100	50			
Pigs		60			
Medical Herbs (stavia)	.02 ha.	.02 ha.	1,663	3,746	
Consumers Co-op Store	1 store	1 store	1,040	946	120
Vinyl Greenhouse	0.3 ha.	0.2 ha	624	249	
Kelp Cultivation	3.0 ha.	delayed	4,158		
Women's Sub-committee	(various projects)		1,040	2,721	
Community Center	construction planned	delayed	5,489		
Kitchen Improvement	30	30	624	936	
Abalone Nursery	2 ha.	cancelled			
Irrigation Well	not planned originally	½ acre irrigated	624	959	
Leaders Training			2,079	1,372	
Athletic & Cultural Events	cancelled because of drought				
Roof Improvement	41 houses	41 houses	6,819	17,364	
Seaweed (laver) Cultivation	1 nursery	1 nursery	2,079	6,237	2,079
Public Health	Parasite Extermination		1,040		1,040
Housing	30 houses cancelled				
School Supplies	Books & drawing materials		624		824
Telephone Line	1	1	520	21	
Public Facilities	bath house village hall	cancelled			
Road Construction	100 m.	100 m.	416	499	
Water Tank	not originally planned	1 tank	624	895	
School Drinking Fountain	not originally planned	1 system	2,017	1,490	
Administration			2,495		
Locally Supported Projects					
Fruit Tree Planting	3,000 persimmons	3,000 persimmons		5,884.	
Irrigation Channel	400 m.	300 m.		1,238.	624.
Ferry Boat Landing	1500	150 m.		labor	10,400.
TOTALS			39,900.	51,565.	14,847.

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[1] Additions and cancellations of projects explained in text.

life has deepened. From this standpoint the CDF program must be seen as an effort to fine-tune and accelerate the process in a few carefully selected areas. CBIRD has supported the Saemaul efforts but has gone beyond them, enabling farmers, fishermen and others in its impact areas to exercise a greater degree of control over their development process. While one general effect of both Saemaul and CBIRD initiatives has probably been to reinforce local producers' dependence on outside institutions and the linkages with the national economy, the CBIRD approach has clearly demonstrated better ways to plan, finance, and direct further progress in accordance with villagers' own goals and needs. It has furnished the multi-village area with a set of institutions and a methodology that enables the local population to make the most of their available resources. Most importantly it provides them with a workable means of acquiring those essential factors of production that are everywhere in short supply: capital, technical know-how, and management skills.

So far, particularly in the mainland impact areas, the CBIRD initiatives have produced impressive results in increased productivity, incomes, and local living standards. On the islands there have been some initial problems and delays, but a wide variety of projects is now being implemented, and given that some of the island programs represent much smaller per capita investment by CDF, the benefits already achieved are significant.

It is not possible to reach any firm conclusions regarding the extent to which successful CDF programs in Korea are replicable in other countries. Nevertheless, it seems useful to raise some leading questions to establish a comparative basis for exploring possibilities.

There can be no doubt that four factors in the Korean environment of the 1970s--the relatively equitable distribution of land holdings, the profitable and expanding markets for agricultural and fishery products, the high value traditionally placed on education and learning in the Korean culture, and the aggressive promotion of rural development by the government--have all contributed importantly to the effectiveness of the CBIRD program. It would seem to follow, therefore, that the absence of any one or combination of these positive factors in another country setting--especially a very low income country with a low economic growth rate--would constitute a serious impediment to replicating the successful CBIRD experience in South Korea.

Concerning the results of CDF's concentration on areas with a "good potential for development," we can give only a speculative answer. CDF was undoubtedly well advised to choose such promising areas as Sanbuk and Chunsong in which to launch its experiment because it required testing out a complicated and untried approach that would inevitably present sizeable problems and risks even under relatively favorable circumstances. To have started with the hardest cases could well have doomed the experiment to failure from the outset. In moving on from these initial areas to the island areas of Wido and Yaksan, CDF did indeed take on some relatively "harder cases." Yet even these areas had a good deal going for them, especially in terms of prospering markets and rising prices for marine products, and the availability of substantial local savings--albeit concentrated in relatively few hands--for reinvestment in development. There are, however, some much "harder cases" in Korea, particularly isolated mountain villages with only poor to moderate development potential and still lying outside the mainstream of the dynamically growing Korean economy. It is reasonable to suppose that if the CBIRD approach were now to be tried out on some of these truly "hard cases" it would encounter much greater difficulties and would probably have to be modified in some ways to achieve significant results.

This observation is not intended to imply that the CBIRD approach and the lessons of its experience in South Korea have no relevance to less prosperous countries. No one can really know until it has actually been tried. What is very clear, however, is that CBIRD's unusually favorable environment in South Korea, especially the extraordinary economic dynamism, cannot readily be replicated elsewhere, so that expectations of what a modified CBIRD approach might achieve under much less favorable economic circumstances should be appropriately modest and realistic.

The discrepancies between CBIRD's more intangible goals concerning social change and welfare and the actual program accomplishments pose a few important unresolved questions that merit review, especially since they apply in many countries.

Can the poor really be helped? Most of the benefits from CDF investment accrue to middle-level and well-off farmers. Relatively little can apparently be done to change this pattern, despite the best intentions and efforts on the part of the CDF staff and Coordinators. In the Korean case it seems evident that except for outright charity, attempts to help the poorest sector of the rural population must depend mainly on the trickle-down effect of generally increased village prosperity. The goals of restructuring society so as to change the distribution of wealth, and of establishing a new welfare-oriented mentality among local elites, are simply beyond the capacities of the CBIRD program--or any other program for that matter, short of a thoroughgoing political revolution.

The question then inevitably arises: given a widespread international donor consensus on the need to improve the lot of the rural poor, to what extent is this goal really practicable? Perhaps there is something wrong with our perceptions of the problems. Have we taken adequate account of the very solid and durable social/structural obstacles to the kinds of change that are so widely regarded as desirable? Or, to put the matter in terms of practical strategies, is it possible to redistribute wealth or focus efforts mainly on aiding the poor, while at the same time promoting self-sustaining rural development? We must conclude here that, in Korea at least, the answer seems to be no. Our assessment of the CBIRD programs suggests that, regardless of its statements of basic principles and objectives, SCF/CDF--in its actual operating procedures--has implicitly reached the same conclusion.

Unless a rural society is in a state of chaotic demoralization or upheaval, which has not been the case in South Korea, an effective integrated development program must be based on existing traditions, values, and institutions. It may be possible to modify their operation in gradual and subtle ways, but if the change agent's commitment compels him to confront and try to do something all at once about such intractable problems as the role of women, child-rearing practices, village authority structures or hierarchies of wealth and status--all in addition to technical agricultural innovation--then truly his program's failure is assured. In Korea, at any rate, effective self-help efforts depend on strengthening and improving village institutions and leadership in accordance with generally recognized, traditional standards--not on undermining or radically transforming them. A community worker can never afford to lose sight of the social mechanisms through which people interact and organize their group efforts, no matter how dedicated he may be to certain overriding objectives.

CDF Coordinators and Community Committees have arrived at reasonably successful compromises on the choices between health and welfare versus income gains in the actual working out of a viable mix of projects in the impact areas. The social welfare effort has been concentrated mainly on women's training, day care centers, and actions to reinvigorate and supplement existing family planning programs. Except for the day care centers, however, the amounts invested have been minor compared to other kinds of projects. Another lesson here, then, is that if "bottom-up" participation and decision-making has any meaning, it is that under the CBIRD approach local leaders will determine the direction that development takes in accordance with their own (and the local administration's) ordering of priorities. Any serious effort by donors to alter local priorities would be self-defeating, which is to say that any major direct effort to improve the lot of the landless and helpless poor will have to wait.

Will villages work together? Another major objective of the CBIRD system has been the formation of multi-village communities as the focus for development efforts. Here it is useful to make a distinction between a true sociological community and a set of villages that are able to plan and work together under unified leadership for mutually agreed upon goals. Only in Sanbuk does there appear to be a strong and broader sense of community in which feelings of mutuality and social responsibility--a concern for the common welfare--go beyond village boundaries to encompass the whole impact area. The impression is inescapable in Sanbuk that farmers not only participate energetically, they also take pride in operating the CBIRD machinery for their own purposes. This same sense of proprietorship is popularly reflected in the frequent, everyday use of the Community Center. In the other CBIRD areas the same general formula is being followed, and there is widespread and grateful recognition of the benefits derived from it. But for most people the activities remain something that is being done for them by outsiders in accordance with externally imposed rules and procedures. In terms of their associations, loyalties and economic goals people continue to identify themselves with a particular village or kinship group. Or, where such ties are weakened, they are likely to migrate to the city.

The idea of the natural village community as the focus of social life and (now) of developmental aspirations is deeply ingrained in Korean mentality. Intimate, long term personal association is regarded as the proper and natural basis for both rural leadership and cooperative effort. Accordingly the Saemaul organizers, while recognizing the importance of planning and coordinated effort on a regional basis, have continued to emphasize the individual village, both as the local decision-making unit and as the basis of labor mobilization. Coordination of larger projects beyond the village level is regarded as the function of local administration. Is it likely that the demonstrated effectiveness of the CBIRD methodology will change official thinking on this issue? On the basis of the present study it seems highly problematical. In the longer run, however, the prestige, authority, and ubiquity of Korean governmental agencies will determine the form and manner of operation of all local institutions.

What are CBIRD's long term prospects? Today the social and economic horizons of Korean farmers are rapidly expanding, and CBIRD projects are accelerating the process. Local leaders are actively participating in guiding the development of their communities. But the Korean Government depends on the docile support of the rural population. It does not look kindly on the formation of any independent, private associations at the local level that might be in a position to challeng the authority of official agencies or serve as a rallying point for demands for greater local autonomy. It would be highly misleading to assume, as some have done, that the organization of local decision-making for economic development represents a significant trend in the direction of grass roots political democracy. Korean tradition, current governmental practice, and the geo-political situation in Northeast Asia all oppose such a tendency, at least in the forseeable future.

Thus it seems unrealistic to expect that a set of model or pilot communities implanted in Korean rural society can eventually transform that society by example in accordance with a particular ideal vision. Rather it is the other way around. As CDF phases out its operation, the model will inevitably be transformed by the particular conditions and popular attitudes of each area and by the ubiquitous and growing influence of the bureaucracy.

At the time of this case study discussions were reportedly going on at high levels in the Korean Government with a view to restructuring the cooperative system to achieve a greater degree of active local participation and greater responsiveness to local needs. Were this to occur, the national organization would then play more of an advisory and facilitating role than, as at present, a stronghanded directive role as executor of government policy. In such a climate, the seeds of local planning, management and self-help that CBIRD has planted and nurtured would have a real chance to thrive. Whether such a vision is utopian or not, it appears to us that the local cooperative is in fact the logical focus of integration and the most promising successor to CBIRD. In any event, there can be little doubt that in the long run the CBIRD innovations will leave some useful and enduring impacts on the Korean rural scene. But just what form they will take and how extensive they will be, only time can tell.

[Edited extract from Meeting the Basic Needs of the Rural Poor: the Integrated Community-Based Approach, Philip H. Coombs, Editor, pp. 534-39, 528-32, 576-83, and 627-34. Copyright© 1980, Pergamon Press, Oxford, England.]

Note: The book from which this article was extracted contains nine studies on ways of meeting basic needs of the rural poor, and can be ordered for $15.00 (prepaid) from:

International Council for Educational Development
Box 217, Essex, Connecticut 06426
U.S.A.

FOR/FOT

Cif

FAS

fOb

CAF

C&F

EXPORT MARKETING

A L'USINE
FOB

FAS

A QUAI

EX WORKS

Commonly used abbreviations in international trade; all refer to money value of goods at different stages of the export process.

EX WORKS or A L'USINE--at factory
FOR/FOT--free on rail/free on truck
(moved onto vehicle from factory)
FAS or A QUAI--free alongside ship
(transported from factory to port)
FOB--free on board (moved onto ship)
C+F--cost and freight
CIF--cost insurance and freight
CAF--cost air freight
(the last three--after shipment by sea or air)

Why Colombia's Clothing Exports Rose and Fell

David Morawetz

[This article summarizes results of a study of Colombia's exports of clothing, with comparisons to such exports from Hong Kong, South Korea and Taiwan. Exports from Colombia rose sharply in the early 1970s, then declined for a variety of reasons. Policy suggestions are offered.]

Although the statistics on Colombia's clothing exports are problematical, the overall trend is clear. Before 1970 exports were negligible. Between 1970 and 1974/75 exports to all markets grew rapidly. After 1974/75 exports to Venezuela and the Caribbean continued to rise, but sales to the United States and Europe declined sharply. This decline leveled off, and there was a slight recovery, between 1977 and 1979; but the volume of exports during the first half of 1979 (converted to an annual rate) was still no greater than the after-the-fall volume of exports of 1976. The all-important pattern of Colombia's exports of clothing to the United States is illustrated in Figure 1.

By concentrating in this study on the rise and decline of Colombia's clothing exports to the United States and Europe, I do not mean to imply that exports to Venezuela and the Caribbean are unimportant. A dollar is a dollar, and neighbors' dollars are as good as anyone's. But exporting apparel to Venezuela and the Caribbean is little different from selling domestically: the same garments can be shipped on essentially the same terms. For exports to the United States and Europe, by contrast, competition is keener and prices are lower; quality control is tighter; lead times are shorter; punctuality demands are stricter; seasonal and fashion changes are more frequent and up-to-dateness in fashion

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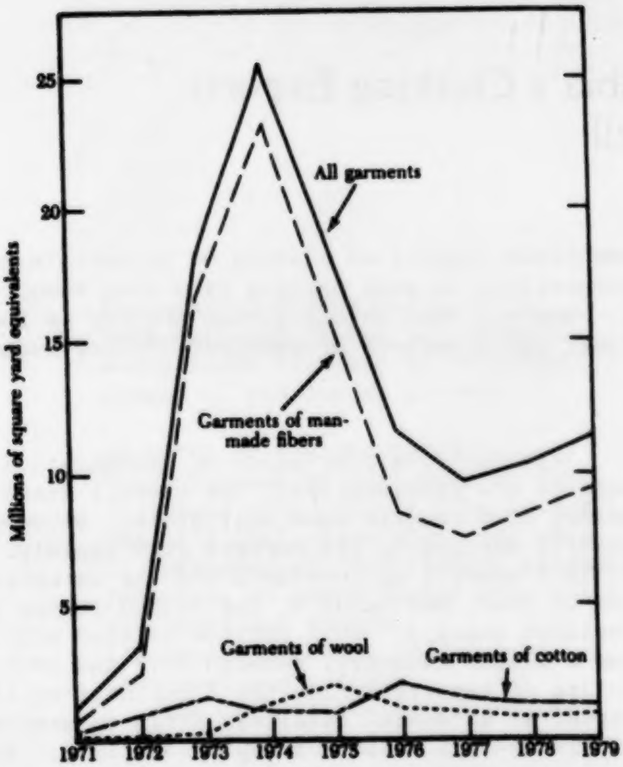
Figure 1. VOLUME OF U.S. IMPORTS OF CLOTHING FROM COLOMBIA BY FABRIC, 1971-79



Note: For 1979 it is assumed that the percentage increase over 1978 is the same for the full year as it was for January to July.

Sources: Tables 8 and 9.

is more important; and the sizes and shapes of customers differ from those in Colombia. Since the Venezuelan and Caribbean markets are minuscule by comparison with those of the United States and Europe, and since Colombian firms have important transport cost and institutional advantages in their own region, it is clearly Colombia's sales to the United States and Europe rather than those to Venezuela and the Caribbean that determine the long-term health and future prospects of the country's garment-exporting industry. If present trends continue, Colombia may have to resign itself to being just another of the many also-rans in the international garment-exporting business; at worst, its exports of apparel to the United States and Europe might disappear altogether. Eventually, if the roots of the problem are not tackled, Colombia may also begin to lose ground to its competitors in Venezuela and the Caribbean.

Causes of the Rise and Fall

The most important single reason Colombia's exports of clothing to the United States and Europe began to grow rapidly after 1970 is that the government's exchange rate and export-incentive policies had begun to make them profitable. Colombia has for some years experienced higher inflation than its trading partners; with no change in the exchange rate, exporters' costs increase faster than their selling prices, and balance of payments deficits rise. Before 1967 Colombian governments tended to tackle balance of payments problems by carrying out a jump devaluation, waiting until inflation had eroded its benefits, and then jump devaluing again. As a result, between 1953 and 1967 there were never more than two consecutive years in which the real effective exchange rate moved in the same direction. (The real effective exchange rate is the nominal or official exchange rate adjusted for export incentives and for domestic and foreign price increases. In this study, it measures the relative profitability of exporting as opposed to selling domestically.) This made exporting a risky business indeed, since a businessman could never be sure what his real returns would be from one year to the next.

From 1967 onward there was a dramatic and well-publicized change. A crawling-peg exchange rate kept rates moving in small frequent steps at approximately the amounts needed to adjust to inflation. With this and other export-incentive measures, for the first time in more than a quarter of a century the real effective exchange rate rose continuously, or at least did not fall significantly, for six consecutive years. Not surprisingly, it took two or three years for this new policy to bear fruit. It took time for entrepreneurs to believe that exporting goods other than coffee and petroleum might be feasible and profitable and that this profitability might be maintained; time to adapt plant and equipment and retrain workers to meet the stringent requirements of export markets; and time for buyers to be found, orders received, goods produced, and an export momentum built up.

Then, in 1973, this time without any official pronouncement--on the contrary, government statements continued and continue to stress the importance of exports for the country's future--the post-1967 policy was reversed. For the next six years the real effective exchange rate underwent an almost continuous decline. Once again, it was two or three years until entrepreneurs perceived what was happening, believed that it was likely to continue, adjusted their plans, and either cut back their exports or switched them to easier neighboring markets. By late 1978, depending on the particular index chosen, the real effective exchange rate was either equal to, or 15 percent below, the level at which it had stood in the balance of payments crisis year of 1967. The 1967-73 improvement in the profitability of exporting in relation to selling domestically was totally reversed. The fall in the profitability of exporting is reflected clearly in the figures for effective protection for 1978. In that year, a firm manufacturing jeans, blouses, or shirts from domestic fabric received effective protection from the tariff and export subsidy system of +30 to +100 percent if it sold the garments in Colombia, compared with -32 to -62 percent if it sold them abroad.

Nonprice factors played some role in the *rise* of Colombia's clothing exports after 1970. Visits of U.S. buyers to Colombia in the early 1970s helped new exporters overcome some of their initial market-entry problems; the purchase by some Colombian companies of licenses to use foreign brand names helped these firms raise both fashion awareness and labor productivity, and hence increased their ability to offer up-to-date garments on world markets at competitive prices. But it was in the *fall* of Colombia's clothing exports to the difficult markets that nonprice factors played a crucial part.

The leveling off or slight recovery of garment exports to the United States after 1977 has rested heavily on a handful of firms that appear to have been holding onto their hard-won U.S. markets for as long as possible in the hope that the profitability of exporting might improve in the future. Three of these firms, which accounted for half Colombia's total garment exports to the United States in 1978, have special long-term arrangements with their U.S. buyers.

Causes of East Asian Predominance

Whereas Hong Kong, South Korea, and Taiwan have a combined population less than 2.5 times that of Colombia, the total value of the three nations' garment exports is 150 times that of Colombia. Colombian clothing exporters interviewed for this study generally blamed cheap labor, heavy government subsidization, or cheap transport costs for the difference. On all three counts they were wrong.

Because of rapidly rising East Asian standards of living, garment industry wages in Hong Kong are now 50 to 100 percent more than those in Colombia, while wages in Korea and Taiwan are at least not significantly lower than Colombia's. Government export subsidies are nonexistent in Hong Kong; in Korea and Taiwan they seem to be no greater than in Colombia. If, as is common, Colombians use air transport whereas East Asians ship by sea, Colombians have a significant advantage: they can land goods in New York for the same transport costs as East Asians but at a saving of four weeks in transit time. Since transport and communication services tend to operate more frequently and more reliably in East Asia, this advantage is offset, but only in part. Nor do U.S. import quotas explain East Asia's predominance; only in two narrowly defined product lines has lack of quota hampered the growth of Colombia's clothing exports, and then only since 1977.

The main price-related factors that do help explain the difference in clothing-export performance between Colombia and East Asia are labor productivity and fabric prices. On average, output per worker in the garment industry appears to be 30 to 50 percent higher in East Asia than in Colombia; as a result, Colombia's labor costs (wages paid per garment produced) are significantly higher than those in Korea, Taiwan, and possibly Hong Kong. Differences in the abilities of management, both top- and middle-level, seem to be of primary importance in explaining this productivity difference, but cultural and social factors may also play some role. The latter might include the degree to which workers identify with the goals of the firm, the degree to which they are susceptible to organization and discipline, the protection they have against being fired, the generalized societal training they receive in manual dexterity, and the place that money income or being seen to be doing one's duty has in workers' and managers' scales of values as against the desire for a relaxed and sociable work experience or an easy life.

In East Asia garment exporters are assured of duty-free access to top-quality fabrics at world prices. In Colombia, despite the fact that local textile firms export fabric and have done so for more than a decade, the prices clothing exporters must pay for domestically produced fabric are 50 to 100 percent above world levels. For cotton cloth, this is because the four large textile firms use their oligopoly power behind high protective walls to raise prices. For synthetics, the problem begins further back in the production chain with the too-small plants for petrochemicals and synthetic fibers, which also enjoy high protection and produce at high unit costs. The effects of the overpricing of domestic fabrics can be seen clearly in Colombia's clothing exports to the United States: whereas more than 80 percent of the country's *textile* exports are of cotton, less than 20 percent of its exports of *garments* are of cotton.

The garment exporters' logical solution to this overpricing problem would seem to be to import fabric under the Vallejo Plan drawback arrangement, whereby imported materials can enter duty-free when they are to become components of exported products. Almost all firms that export to the difficult markets do this; but administrative problems and delays reduce the scheme's value. At least two weeks' delay is incurred before an import request is approved by the administrative authority, and at least two to four weeks more are needed to clear the goods, once landed, through customs. Since the season in the clothing business is only twelve weeks, these delays are crucial. Together, they effectively nullify, and often reverse, the one clear advantage that Colombia has over East Asia in garment exporting: the ability to offer shorter lead and turnaround times. Since they are of unpredictable length, the delays also increase the risk involved in exporting. The export-processing zones (free zones), which ought to provide a solution to these problems, have not done so.

Nonprice Factors

Among the nonprice reasons for Colombia's inability to compete with East Asia, differences in the degree to which quality control and punctuality of delivery are maintained seem to be the most important. The best Colombian firms meet these two criteria as well as any other firms; but the less than satisfactory performance of some Colombian companies has given the country a bad name and has contributed to the fall of the country's exports to the difficult markets. Some managers apparently do not perceive how important quality control and punctuality are for sales to world markets. This may partly reflect the fact that quality control and punctuality norms in Colombia are rather different from those in the the United States and Europe; which, in turn, may be partly because Colombian garment producers have been sheltered from import competition in the domestic market. The unreliability of domestic textile suppliers (both in quality and in the timing of deliveries), delays in importing inputs, and a serious problem with robberies in the ports all aggravate the quality control and punctuality problems.

Knowing the markets. Clothing producers who wish to export garments to world markets have little chance of breaking into them if they are not reasonably up-to-date with world fashion trends. One way of keeping up-to-date might be to travel abroad extensively and often; but most Colombian clothing enterprises are family firms in which the owner is needed to run the business at home. Alternatively, the producer might try to study fashion trends in imports--but imports of finished garments were prohibited in Colombia until 1973, and because of stiff tariffs and prior licensing never exceeded 1 percent of total consumption through 1977.

A third option, the only real one open to a large number of small and medium-size Colombian firms, is to sign a licensing agreement with a foreign firm. As part of most licensing agreements in the apparel business, the licensor agrees to supply the licensee with fashion information relevant to its line of business. The precise form in which the information is supplied varies widely, from in-house fashion magazines to ready-to-use patterns and molds; but the value of this information in raising the fashion awareness of local firms, and hence their ability to export when exporting is profitable, is indisputable.

Productivity. In addition to supplying fashion information, licensing agreements have further helped Colombian clothing firms to begin exporting by providing technical assistance. Again, the precise form this assistance takes has varied widely. Some foreign firms have carried out time and motion studies in their licensees' plants and have recommended ways to reorganize the flow of production. Others have made suggestions concerning techniques of cutting fabric, machine maintenance schedules, methods of sewing, and the use of better materials (such as collar stays and linings) or better methods of joining materials (fusion instead of sewing). Several of the firms I interviewed indicated that this production help was by far the most significant benefit of the foreign licensing arrangement. In one case, the time needed to sew a jacket fell from 146 minutes to 90 minutes as a result of assistance from a full-time production engineer provided as part of the agreement. This 38 percent reduction in labor costs was instrumental in enabling the firm to reduce its prices sufficiently to begin exporting to the United States; its cumulative exports to that market totaled more than $5 million by 1978, and it was planning a 50 percent increase in production capacity and exports for 1979-80. In a second instance, the Colombian licensee of an internationally famous brand of jeans explained that his labor costs had been halved since he received technical help from the U.S. parent company; he now produces twice as many pairs of jeans with the same number of workers. The U.S. parent company's jeans used to be smuggled into Colombia but now this has ceased; instead, jeans made in Colombia with the U.S. company's label are smuggled out of Colombia and into neighboring markets.

Small firms. In 1970-71, I interviewed the managers of several clothing firms in Colombia for another project. It appeared then that much of the apparel produced by these companies was competitive in world terms in both price and quality, yet the firms were not able to export because they were too small either to seek out the markets or, if buyers visited them--as happened in several cases--to accept the large orders buyers wanted to place. How, if at all, were these problems overcome after 1970-71? What role did small firms play in the rise of Colombia's clothing exports?

To the best of my knowledge, no published or unpublished data are available on clothing exports by size of firm in Colombia. An indirect but fairly clear idea of the relative importance of small firms in these exports can be gained by examining the sample of clothing firms interviewed for the present project. These thirty firms alone accounted for between half and three-quarters of total Colombian clothing exports during 1975-78 and for fully 69 to 90 percent of exports carried out using the Vallejo Plan. The top ten exporters in the sample alone accounted for from 38 to 65 percent of total exports and for from 58 to 74 percent of Vallejo Plan exports during the same period. Even if all clothing exporters not included in the sample were small, which is not the case, small exporters have played a limited role in Colombia's clothing export history.

Small firms that wish to export have four possible solutions to the problems, especially in marketing, that their lack of size creates: they can join together with other small firms in a consortium; they can export through an intermediary or trading company; they can manufacture goods as subcontractors for a larger exporter; or they can grow and themselves become large enterprises. Small firms in Colombia have tried all four methods.

Between 1970 and 1973 meetings were held to establish export-oriented consortia of small and medium-size clothing firms in Bucaramanga (Consexport), Pereira (Conevica), Medellin (Confexcol), Cali (Exporcali), and Barranquilla. By 1978 the last of these consortia had failed. The Bucaramanga and Pereira groups enjoyed some success for five to seven years but then collapsed; the central body set up in Medellin never had much more than advisory functions; and the Cali and Barranquilla consortia never got off the ground. Problems in mutual distrust and obtaining financial support for overseas operations seem to explain these failures.

If small clothing enterprises have had little success in exporting through consortia, they have not had much better luck with intermediaries--firms whose primary business is to arrange for the export of articles produced by other firms. Thirteen firms listed as intermediaries were registered as exporting more than $100,000 worth of apparel during 1977, but six of these had disappeared by late 1978; apparently it is not a very stable business to be in. In the event, we were able to interview five of the thirteen. A solidly based intermediary might be expected to have a well organized market-search system, well staffed branch offices overseas, and well-established relations with clients and suppliers. None of the firms we interviewed fits this image. The most successful operation, according to volume of exports, employs two people in its market-searching department and is owned and managed by a lawyer who plans to retire in three or four years to devote himself to writing law books. One agency is run single-handedly by a man who sells anything from blouses to fertiizer and who uses the business partly as a means of visiting his former wife and children in the United States. Another is run from a single dark room in a seedy section of town by a Colombian who has been expelled from Mexico and from the United States (apparently for shady dealings) and who likes to travel. All buy their merchandise primarily from small producers who would not be able to export independently. The first four complained that their suppliers' goods had sometimes been of poor quality and that they had not always been delivered on time; at one stage or another, all four had made an attempt to set up their own production facilities to overcome this problem.

At least eight of the medium and large firms interviewed have subcontracted work out to smaller firms at one time or another, and two of the smaller firms have themselves worked as subcontractors for others. Subcontracting tended to be most common when the parent firm intended to introduce new product lines but had not yet had a chance to set up its own production facilities. It also occurred, however, when demand was irregular and the parent wished to reduce its risks by avoiding the need to hire workers who would later be difficult to fire. The difficulty and expense involved in firing workers under Colombian law seems to be extremely important in restricting the extent to which firms are willing to specialize in the risky and relatively unstable business of exporting. Generally, no more than 25 percent or so of the parent's value of output was subcontracted out at any one time. None of the firms that stated they were participating in subcontracting arrangements offered any criticism about how they had worked out.

If consortia, intermediaries, and subcontracting arrangements have played only modest roles in Colombia's experience with clothing exports, the growth of small firms into large ones seems to have been more important. Not one of the twenty-five large firms in the sample started out with as many as a hundred employees, and most of them appear to have commenced operations with forty or fewer. In most cases, growth seems to have taken place gradually over at least fifteen or twenty years and to have been financed both from reinvested profits and by borrowing. There were, nevertheless, a few cases of extremely rapid growth.

Quality control. If a garment is to be of acceptable quality in the U.S. market, it must be styled, cut, and sized according to specifications; it must be strongly sewn and neatly finished; and the fabric, buttons, linings, and other materials of which it is made must be good enough to pass shrinkage, colorfastness, and other quality control tests. The best-managed garment-making firms in Colombia consistently meet these standards--but a number of companies do not.

The results of tests carried out by a large U.S. retail chain on apparel purchased in Colombia give some idea of the degree of variance in quality that can be found among some of the less reliable Colombian suppliers. Of twenty-two Colombian garments (mostly children's wear) tested by this chain during 1976-77, thirteen were judged to be unsatisfactory; on three, follow-up information was required; three were satisfactory with qualifications; and only three were clearly satisfactory. That is, of the twenty-two items examined, 59 percent were rejected outright, and only 14 percent were clearly acceptable. By comparison, apparel from East Asia tested by the same quality control department during 1976-78 generally had a rejection rate of 10, or at worst 20, percent.

The quality problems that this and other U.S. buyers have encountered with Colombian garments cover a broad spectrum:

- A maker of children's jeans did not have any small zippers in stock, so he cut off the ends of some larger ones and used these instead. The zippers broke, and the entire $25,000 shipment was worthless.

- When some children's pants were washed in washing machines, they shrank more than was tolerable, and U.S. customers began returning them to the stores. The manufacturer's response was "tell them to wash the pants by hand." (Household-owned washing machines are less common in Colombia than in the United States.)

- The stripe on the shoulder of a boy's cotton sports shirt lost its color in the wash. The manufacturer suggested that the shirt be labeled "dry clean only."

- The lining within the collar of some corduroy shirts was poorly constructed, with the result that the garments lost their attractiveness after two or three washes. The manufacturer was not willing to change his production process for just one customer.

- In several shipments of women's blouses the sizing was not accurate, so the buyer scoured Colombia for a free-lance pattern maker familiar with U.S. sizes. Eventually he found one, but even this person did not possess the necessary mannequins and tools. (In Korea and Taiwan many pattern makers specialize solely in work for the U.S. market.)

As can be inferred from these instances, some Colombian garment exporters simply do not understand the requirements of the U.S. market--zippers that break, pants that shrink excessively, colors that run, collar linings that wrinkle, sizes that are incorrect are not acceptable. True, hand-washing or dry-cleaning could solve some of these problems, but American consumers are not interested in children's pants that have to be washed by hand or boys' shirts that have to be dry-cleaned. As one buyer complained, "They were trying to sell us what they've always sold in Colombia instead of adjusting to U.S. requirements." This buyer canceled a Colombian apparel-purchasing program of a million dollars a year as a result of quality control problems with two or three firms; her department store now buys the items in East Asia.

At least some officials in Colombia seem to be aware of the quality control problem. In a speech in Bogota in late 1978, the Minister of Development made the same point as the New York buyer: "Even though it is painful to admit it, we are inexpert at international marketing...we have thought, wrongly, that we could simply export what was left over." Nor are Colombians alone in sometimes misjudging the markets to which they sell.

Punctual delivery. Delivery dates are much more important in the U.S. market or in Europe than in Colombia, Venezuela, and the Caribbean because seasonal variations in fashion and climate, and hence in the clothing that is salable, are more marked in the northern countries. A department store buyer in the United States who orders shirts for delivery in March is quite likely to cancel the order if they have not arrived by April 1, because after that date they can be sold only at a discount of 40 to 50 percent. Since replacement merchandise is not always immediately available, the floor space set aside for the canceled order might be underutilized, and the money that was spent on newspaper advertising might be wasted. It takes only two or three episodes like this for a department store buyer to lose his job, which helps explain why buyers attach so much importance to delivery dates.

Some of the U.S. buyers I interviewed expressed total satisfaction with the punctuality of their Colombian suppliers. But many were less than satisfied on the score, and several indicated that the failure of some Colombian suppliers to deliver goods on time was the last straw that caused them to cease purchasing garments in Colombia. A few specific instances illustrate the nature of the problem. A U.S. manufacturer of custom-tailored slacks said that it costs him $5 more to have his trousers made in the United States than in Colombia, but that the increased reliability of delivery is worth $10 more to his customers. A U.S. importer-wholesaler who tried to specialize in Colombian apparel eventually lost most of his U.S. customers because of the unpunctuality of some of his suppliers. A department store chain ordered 100,000 jackets from a large Colombian firm, trimmed the order to 50,000 when the supplier ran into difficulties, then cut it to 5,000--"and in the end they did not even deliver five samples. I would never go back to them," my informant stated. The buyers would be wary of going to Colombia again.

The most important single determinant of the degree to which a garment-exporting firm is able to maintain quality control standards and to deliver goods on time is the quality of its management. Thus, it is no coincidence that several of the Colombian companies that have often delivered unacceptable garments have also often delivered late--whereas the firms that almost always maintain high quality standards are those that almost always deliver on time. But a firm does not exist in isolation from its environment; some problems that are external to the individual enterprise can tax, and occasionally defeat, even the best managers--for example, when import barriers or local unreliability prevent a manufacturer from getting his materials in the desired quantities on time to make them up for an export order.

U.S. garment buyers commonly point out that they can get anything they want in Hong Kong, Korea, or Taiwan--any garment, in any material (cotton, wool, synthetics, fur, or leather), at competitive prices, of acceptable quality, and delivered on time. In Colombia, by contrast, the range of garments and fabrics is limited, prices are in general higher, and quality and delivery times are less dependable. As a result, whereas many buyers maintain full-time purchasing offices in East Asia, there is not a single permanent foreign buying office in Colombia that specializes in clothing. This, in turn, makes garment exporting a riskier business for Colombian clothing firms than it is for East Asians. Thus, few Colombian firms specialize in exporting, few foreign buyers come to the country--and the East Asia-Colombia gap continues to widen. Success breeds success, failure breeds failure.

Despite the apparent bleakness of the picture, it is important not to lose perspective. Only ten years ago, Colombia exported hardly any clothing, and few Colombians believed that exporting to world markets on today's scale would be feasible. If the apparently impossible could be achieved once, perhaps it can be achieved again.

Policy Options for Colombia

If the Colombian government is interested in helping the country's garment exporters compete with East Asia, what measures might it take? First, it might try to ensure that exporting garments is made and remains at least as profitable as selling the same goods at home. To achieve this, the real effective exchange rate for clothing exports would need to be raised--this would at the same time help narrow the cost differential between Colombia and East Asia--and the government would have to commit itself and its successors to maintaining this real effective rate for at least five or ten years. Such long-term policy commitments are of course more difficult to make under the Colombian political system, which seems to require a biparty agreement, than under the systems that prevail in Hong Kong, Korea and Taiwan. Protection against imported garments might also be lowered.

Second, clothing exporters would need to be assured of duty-free, minimally delayed access to a wide range of top-quality fabrics at world prices. Tariffs on imported textiles might be lowered, and the full range of fabric imports could be transferred from the licensing list to the free list. The Vallejo Plan might be streamlined so that approvals could be granted in twenty-four hours instead of two weeks. The ports and customs authority would need to be overhauled to ensure that, once goods arrive, they are cleared in a day or two instead of weeks. The existing free zones might be studied to discover the reasons for their failure; new, improved zones could then be established. An indirect export subsidy might be introduced; domestic textile firms that sell fabric to garment makers, who in turn use this cloth in their exports, would then be entitled to receive the export subsidy for such sales, and perhaps concessional export credit as well. Indirect export subsidies of this type have been used successfully for important domestically produced inputs in Korea, Taiwan, and Israel.

Third, since management ability seems to be crucial in both price (labor productivity) and nonprice (quality control and punctuality) areas, the government might try various strategies to improve the country's management. Large numbers of top- and middle-level managers and graduate students in business might be sent abroad for study and work experience and for exposure to U.S. and European standards of quality control and punctuality of delivery. Foreign buyers could be invited to Colombia to give short courses for managers and would-be managers, which would again emphasize the important, but often neglected, nonprice aspects of exporting.

It is difficult to rank these policy options in order of importance. As New York buyers repeatedly stressed, price, quality, and punctuality are all necessary conditions of export success in the clothing industry. The absence of any one of these disqualifies the would-be exporter from serious consideration. If one set of implications had to be chosen as the most important, however, it would probably be that relating to price; for, if exporting were made more profitable, entrepreneurs and foreign buyers would have a strong incentive to overcome the quality control and punctuality problems on their own.

It has been argued in Colombia that the nation's governments have been right to allow the real effective exchange rate to decline since 1973. Inflationary pressures began increasing about that year, making a slowdown in the rate of devaluation apparently desirable, while the coffee bonanza of 1975 and later years has lessened the need for dollars to be earned by clothing and other manufactured exports. If and when coffee prices fall, this line of reasoning concludes, then the pace of devaluation can be resumed, and clothing exports will pick up again. Although this argument has some appeal, it contains two important flaws. First, clothing manufacturers learn from experience. They were drawn into exporting once and have now painfully begun to withdraw; they are likely to be less willing to invest the time, effort, and money needed to break into foreign markets again. Second, foreign buyers learn from experience too, with the result that it is sometimes more difficult for an exporter to regain a lost market (particularly if the market was lost for quality control or punctuality reasons) than it is to enter the same market for the first time. Buyers have the whole world to choose from; if they have been let down by Colombian suppliers once, they are likely to try many other possibilities before they return. If clothing and other manufactured exports are to be put on a long-run footing, therefore, a more appropriate response to inflationary pressures and balance of payments surpluses arising from high coffee prices might be to push ahead with the liberalization of imports (which helps on both fronts and aids manufactured exports as well), rather than to cut back on the rate of devaluation.

Generalizing to Other Industries

The preceding policy implications were drawn up on the assumption that the Colombian government is interested in stimulating exports of clothing to world markets; but, of course, there is no particular reason to want to export *clothing* as opposed to any other commodity. It may be useful, therefore, to examine the extent to which the conclusions and policy implications derived from this study are generalizable to other Colombian manufacturing industries.

Colombia's exports of other manufactured goods appear to have followed a pattern similar to that of exports of clothing to all destinations: a rapid rise through 1974-75 followed by a more modest rate of increase since those years. The increasing importance of Venezuela as a destination also seems to be paralleled: by 1977-78 Venezuela had overtaken the United States as the most important single market for Colombia's total registered noncoffee exports. The difference in order of magnitude between Colombia's exports of other manufactured goods and those of Hong Kong, Korea, and Taiwan is almost as great as for clothing.

Clothing is similar to other industries in which developing countries have achieved export success in that average wages are low, the share of wages in value added is high, and economies of scale are unimportant. Garments tend to be differentiated from each other more than some other developing-country manufactured exports, but the marketing problems that arise from this differentiation are generally taken care of by the developed-country buyers. This all-important role of the buyers is by no means limited to the clothing industry; rather, it is common in many types of developing-country manufactured exports. The most important problems that have restricted Colombia's clothing exports seem likely to have affected other Colombian industrial export and potential export industries as well: a combination of high protection for domestic sale of final goods and declining real effective exchange rates that has caused the relative and absolute profitability of exporting, as opposed to selling domestically, to decline; lack of access to inputs at world prices because of high protection granted to domestic input producers and because of problems with the Vallejo Plan, ports, and customs; and low labor productivity, inadequate quality control, and unpunctuality of deliveries resulting from management deficiencies and cultural factors. Clothing is also typical of other Colombian industries in the disproportionate importance of a few larger firms in total foreign sales; the apparent inability of most small firms to export, whether alone, through intermediaries, or through consortia; the failure of the free zones to stimulate exports (with the partial exception of manufactured metal products); and the inability of local exporters to capture a significant share of total marketing profits.

One difference between clothing and other industries is that since seasons are more important and fashions change more frequently in the case of garments, short lead times and punctuality in delivering are more important than in most industries. Nevertheless, no exporter of manufactured goods is likely to keep his clients for long if his deliveries are continually late or if his lead times are weeks longer than those of his competitors. For example, one U.S. manufacturer closed down an electronics assembly plant it had established in Haiti in favor of one in Mexico, even though Mexican wages were more than double those in Haiti, because the cycle time was two weeks shorter in Mexico.

For many manufactured products quality control is extremely important. The damage that results if trousers shrink, colors run, or zippers break can hardly be compared with the consequences that would ensue if a lathe's cutting edge or an automobile's wheel nuts were defective. Indeed, there must be few manufactured goods in which quality control is not of primary importance. It might seem, too, that it is more important for exporters of garments to have access to a wide range of imported inputs than it is for producers of other goods--yet again this is not the case. Some 90 percent of all manufactured exports from developing nations originate in countries that guarantee their producers this kind of access.

Perhaps the most important difference between apparel and other sectors for the present discussion is that clothing is currently one of the few industries in which developing-country exports are subject to quota restrictions. The distribution of quotas among exporting nations tends to be based on historical performance; thus, Colombia's garment quotas are only a fraction the size of those of Hong Kong, Korea, and Taiwan. This means that even if all obstacles to increased exports were removed tomorrow, Colombia could still look forward to only modest rates of increase in its exports of apparel to the United States and Europe. These possible increases, however, would by no means be zero: to begin with, clothing exports could increase severalfold before all present quotas are utilized. After that, the successful East Asian strategy of upgrading items within quota categories and hence increasing the value of exports while the volume is held constant could be followed by Colombia.

In sum, clothing shares important characteristics with other industries in which developing countries have achieved export success to date; and the principal problems that have impeded Colombia's clothing exports in the past seem likely to have retarded the exports of other Colombian manufactured exports too. Thus, the findings of this study may well be relevant not only to clothing but also to other Colombian export and potential export industries.

Generalizing to Other Latin American Countries

To what extent are the conclusions and policy implications of this study likely to be relevant to Latin American countries other than Colombia? In most relevant respects, Colombia is about as close to an "average" Latin American country as can be found. It ranks fourth after Brazil, Mexico, and Argentina in size of population, and fifth after these three and Venezuela in size of gross national product (GNP). It is neither among the most nor the least industrialized Latin American nations; in GNP per capita, it is poorer than many countries but by no means the poorest; the growth rate of its GNP per capita has been close to the Latin American average for two and a half decades; and its distribution of wealth and income is typically skewed.

In total value of clothing exports, Colombia ranks third along with Argentina behind Mexico and Brazil; in total value of exports of all manufactured goods, it ranks fourth behind Brazil, Mexico, and Argentina. In clothing exports per head of population, Colombia is surpassed only by Mexico; while in per capita exports of all manufactured goods, Colombia ($27) is surpassed by Mexico ($38) and Argentina ($37), but ranks ahead of Brazil ($21), Chile ($11), Venezuela ($10), and most Latin American countries (see Table 1). By Latin American standards, therefore, Colombia has been at least moderately successful as an exporter of clothing and other manufactured goods; certainly, its inability to compete with Hong Kong, Taiwan, and Korea has not been unusual. Colombia has been more or less typical in the timing and nature of its policy changes: several other Latin American countries shifted from import substitution to export-promotion strategies during the mid- to late 1960s. It has also been about average for Latin America in its degree of political and policy continuity.

Table 1. PER CAPITA EXPORTS OF CLOTHING AND ALL MANUFACTURED GOODS: SELECTED EAST ASIAN AND LATIN AMERICAN ECONOMIES, 1976
(Dollars)

Area	*Per capita exports*	
	All manufactured goods	*Clothing*
East Asia		
Hong Kong	**1,620**	**727**
Taiwan	**433**	**83**
Korea	**185**	**51**
Weighted average	**359**	**108**
Latin America		
Mexico	**38**[a]	**3**[a,b]
Argentina	**37**	**2**
Colombia	**27**	**2**
Brazil	**21**	**1**
Chile	**11**[c]	—
Venezuela	**10**[b]	—
Weighted average	**25**	**1**

— Negligible.

a. Estimated including border zone, with the help of U.S. as well as Mexican data.

b. 1975.

c. 1974.

Sources: World Bank, United Nations.

Many of the problems that have hampered Colombia's exports of clothing and other manufactured goods seem likely to have been similarly important in other Latin American countries. In the face of sharply fluctuating world prices for natural-resource-based exports and moderate to runaway domestic rates of inflation, few Latin American countries have managed to maintain constant real effective exchange rates (and hence constant real returns to exporting) for any length of time. In most countries, export subsidies were simply grafted onto the existing import substitution structure; since protection against imports remains high, the incentive to sell domestically is still greater than to export. Many countries still hamper their firms' access to imported inputs when domestically produced substitutes are available; and the port, customs, transport, and communications problems of Colombia are by no means unique. Colombia's low level of labor productivity in garment production is typical for Latin America--if anything, Colombian productivity is 5 percent above the Latin American average. Some of the cultural characteristics that may cause Colombia's relatively inadequate productivity, quality control, and punctuality (for instance, the relatively relaxed attitude to time) are shared with much of Latin America. Colombia differs from much of Latin America in being better located to sell to the U.S. east coast market; but Central America and the Caribbean islands share this locational advantage, while Mexico has still easier access to the United States.

In sum, Colombia is in many respects an average Latin American country; its manufactured export performance has been quite good by Latin American standards; and many of the problems that have impeded its exports of clothing and other manufactured products seem likely to have retarded the manufactured exports of other Latin American countries too.

[Edited extract from the final chapter, with inserts from chapters 3 and 6 of Why the Emperor's New Clothes are Not Made in Colombia, David Morawetz, Oxford University Press. Copyright© 1981 by the World Bank.]

Handicrafts (1): Marketing in the Eighties

John Nelson

[Although the boom in handicraft exports of a decade ago has ended, it is still possible for some developing countries to achieve such exports by gearing their activities to marketing requirements, as described below.]

The boom in the handicrafts market during the seventies has now subsided, and with it have gone the days when handcrafted articles could be exported to industrialized countries with little or no marketing effort. Consumers are now much more discriminating in the type and quality of craft items they purchase. Some categories of handicrafts can no longer be sold at all in the market, because either the novelty of such items has worn off or competing low-cost manufactured articles have edged out the handmade products.

Certain types of craft exports can still, however, be highly profitable for developing countries, including the least developed. In many least developed countries the craft sector plays a major role in the overall exports of the country, since the skills required to produce handicrafts already exist and most of the materials that go into the crafts are available locally. Craft exports also have an important function in countries where rural development is a national priority, as handicrafts produced in rural areas can provide supplemental income and thereby encourage more farmers to stay on the land. For craft exports to bring such benefits, suppliers must study the market trends and specific sales opportunities carefully, and develop their marketing strategies accordingly. Producers who

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export crafts must also be able to assure that they meet certain basic production conditions in order to export at a profit, rather than a loss, as all too frequently happens in this sector.

The term "handicrafts" has been applied to just about any object that has been partially or completely made by hand--from fine jewelry to household furniture. For the discussion that follows, however, handicrafts have been defined as products that are totally or partially made by hand; are produced with low initial capital investment; often have a design that reflects local cultural factors; and are generally made from materials available within the producing country.

The Boom and its Aftermath

During the late sixties and early seventies the market for handicrafts in Western Europe and North America expanded rapidly. Craft items of nearly all types found ready buyers, and demand extended across a wide range of the buying population. By end of the 1970s, however, the situation had changed considerably as consumer tastes evolved and new marketing patterns developed. As a result, the types of handicrafts that can be successfully exported to these countries have become more limited, and the way in which they should be marketed more complex.

New market sectors. Demand rose rapidly in the late sixties and early seventies for objects and designs that represented both the exotic and a "return to nature." Consumers began to lose interest in manufactured products in general, both utilitarian and decorative, and sought alternatives to what many of them considered to be the "plastic" or artificial culture in which they lived. This new life style also reflected a growing awareness of the cultural traditions of other countries, stemming from increased travel and more extensive coverage of foreign countries by the mass media. Handicrafts therefore gained a strong position because they could be associated with both of these trends.

The awakening of ethnic pride among minority groups during this period, particularly in North America, likewise opened up a new market which focused on consumers who wished to emphasize their own cultural origins, but it also extended to the general buying public. This new movement generated interest in all forms of ethnic clothing, jewelry and home furnishings. Fashion designers and interior home decorators in particular picked up on this trend and were able to sell large quantities of handmade baskets, fabrics and other decorative and utilitarian products.

However, handicraft demand in these new market sectors gradually declined towards the end of the seventies. As ethnic handicrafts increasingly became associated with one particular sector of the population, the general buying public became less interested in purchasing them. At the same time fashion styles changed, as is characteristic of this market, and "ethnic" designs were no longer in demand. When interest in minority problems subsided in the mid-seventies, so did the market for ethnic products. In the case of sales to the "back to nature" sector, demand for purely decorative items dropped as the novelty of such goods wore off and as consumer buying power tightened with the recession. Utilitarian craft articles were still in demand, but only if they could compete in price and performance with manufactured items.

Strong role of intermediaries. During the boom period most craft producers in developing countries did not take advantage of the expanding market to develop a marketing strategy aimed at maximizing profits and long-term sales. Instead they continued to concentrate on production, leaving the export marketing to someone else.

One type of intermediary who played a major role in the marketing of handicrafts during the seventies was the middleman, especially wholesalers in both the producing and importing countries. By the mid-seventies many craft producers were complaining that much of their profit was going to such middlemen. Producers also objected to the increasing number of individual traders who were coming to their countries to purchase large quantities of crafts and ship them directly to lucrative sales outlets in Europe and North America.

While it is true that middlemen were making profits from handicraft sales, there was also the other side of the coin: handicraft producers generally failed to develop reliable marketing structures themselves in order to aggressively search out new sales opportunities and professionally fill orders. Buyers naturally wanted their supplies delivered on time, according to specified quality standards. Middlemen could carry out these functions by helping expose new products to specialty shops and large department stores and assuring that orders went out as scheduled. The result was that producers lost much of the profit they could have been making if they had organized the marketing operation themselves.

Another type of intermediary that many producers worked through in the seventies was the "alternative marketing organization." These are primarily charitable agencies that buy handicrafts from developing countries and resell them on a nonprofit basis. Their purpose is to replace the "middleman" so that producers can get higher returns. Over 30 such organizations now exist in various countries. While they differ in size and the emphasis they give to marketing (as opposed to other charitable programs that they may also run), they all basically try to help the craftsman earn more from his trade. The results, however, have not always been those hoped for.

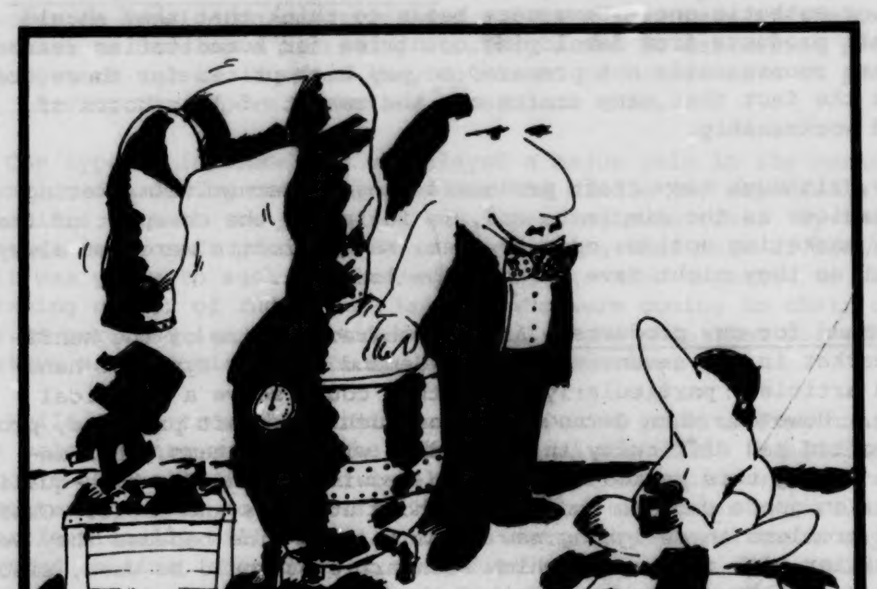
In the first place, alternative marketing organizations tend to separate the producer from his market to an even greater extent than do the middlemen. Originally, it was hoped that these agencies could handle export operations for the craftsman in the initial period of setting up his business, giving him time to organize his business and gradually learn how to export. But in many cases the producer was not able to learn about exporting precisely because he was no longer directly in contact with his customers. He was dependent upon the marketing organization to tell him what product to make, in what quantities and at what prices.

Second, the type of marketing strategy that these agencies used tended to give handicrafts a charitable image, rather than a utilitarian or esthetic one. Consumers began to think that they should buy craft products from developing countries for humanitarian reasons. They were consequently not prepared to pay high prices for these items, despite the fact that many crafts are the result of long hours of skilled workmanship.

So, although many craft producers chose alternative marketing organizations as the simplest, and, in fairness, the cheapest of the various marketing options open to them, their profits were not always as great as they might have been in the long run.

Demand for new products. Another characteristic of the handicraft market in the seventies was the demand for new types of handcrafted articles, particularly those that could serve a practical purpose. However, when demand rose for such new craft products, producers often had difficulty in responding with new items. For instance, during this period there was a growing demand for high-quality utilitarian goods such as wooden household utensils and tools. Craftsmen had problems in designing new items in this line because they were not familiar with the way in which such articles would be used, since in most cases they had never visited the market and therefore were not familiar with the living habits there. Another problem in developing new products was obtaining capital to redirect production. In general, even when a producer has a good idea for a new product, he is often not able to get the financing necessary to buy new tools and new materials and develop the prototypes, as banks are seldom willing to loan money to small businessmen for research on new product ideas. As a result, craft producers were forced to continue making primarily decorative crafts, and they ultimately flooded the market with them.

Imitations. The growth in popularity of handicrafts during the seventies was actually counter-productive for certain craft suppliers. Copies were produced by machine of many handcrafted items and sold at lower prices. Of course, high-quality products could not be duplicated as easily as the less expensive crafts. But producers in developing countries had not foreseen the ingenuity of Western manufacturers, and also of a few developing countries that could undercut their prices because of low-cost labor. In many cases craft producers were not even aware that their products were being successfully copied and sold at far cheaper prices than they themselves could ever sell them for and still make a profit. This happened, for example, with tie-dye fabrics, which in some cases were cleverly printed by machine and almost indistinguishable from real tie-dye material. Jewelry components, for instance for Ethiopian jewelry, were copied through manufacturing. As a result, the average customer could no longer tell whether an article that looked, for example, as though it had been made in Africa was in fact produced elsewhere, and perhaps by machine.



The popularity of crafts sometimes led to the production of machine-made imitations.

Another development occurred that also eroded the position of craft suppliers. Particularly in the U.S. market, but also in Western Europe, consumers wanted to go a step beyond buying finished craft products--they wanted to make these crafts themselves. This gave rise to a booming business in do-it-yourself craft kits, handicraft instruction classes and the like. Kits appeared on the market to produce everything from African jewelry to carved Bolivian calabashes.

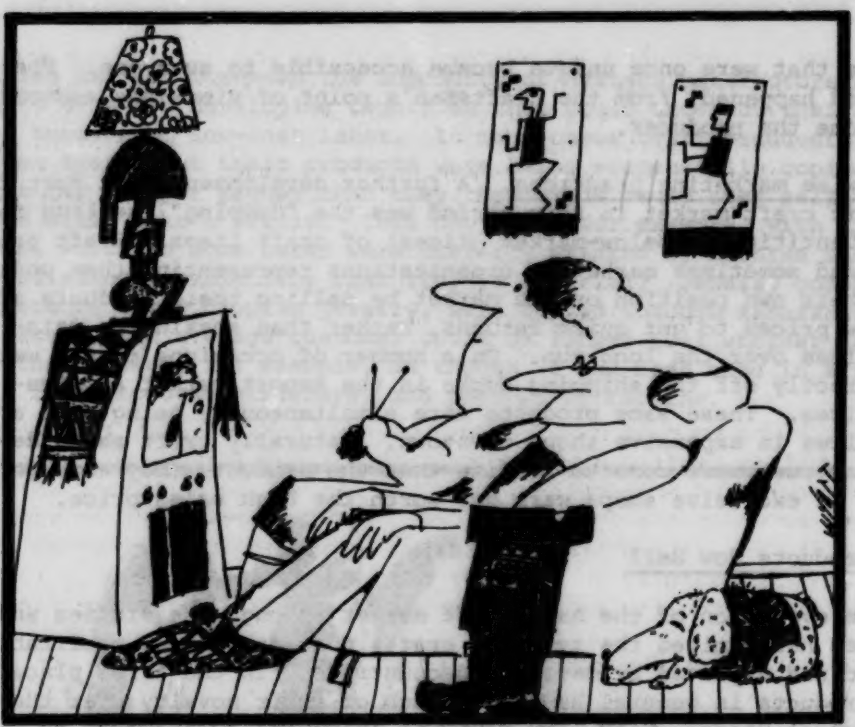
Products that were once unique became accessible to everyone. The worst had happened, from the craftsman's point of view--the customer had become the producer.

Unwise marketing practices. A further development that hurt the authentic craft market in this period was the "dumping" (selling in large quantities at below-market prices) of craft items. Craft producers and sometimes marketing organizations representing them undermined their own position on the market by selling their products at very low prices to get quick returns, rather than seeking to maintain prices over the long run. On a number of occasions crafts were sold directly off the shipping docks in the export market at give-away prices. These same products were simultaneously being sold at high prices in expensive shops downtown. Naturally craft sales declined as customers came to realize that the products they were purchasing in exclusive shops were not worth the high sales price.

Which Products Now Sell

The evolution of the handicraft market through the sixties and seventies has limited the types of crafts that can now be profitably produced and exported by developing countries. In the first place, craft products in general have lost much of their novelty over the last several years. With less money to spend, consumers tend to choose goods that will do the job well, whether they are machine-produced or handmade. As a result, importers are now more interested in the profitability of a purchase than its exotic or handmade features. In addition they know that it is difficult for the average consumer to distinguish between handmade products and factory-produced items, even if he is looking for a craft article. Only products that are considered a necessity by the consumer can be expected to sell well now, given the current market situation. Suppliers cannot hope to successfully export a handicraft article if demand for it does not already exist, as the cost of creating demand through advertising and publicity is expensive and often prohibitive.

The main market sectors that are now open to craft suppliers in developing countries are utilitarian products that can serve as competitively priced alternatives to manufactured goods, and, to a lesser extent, certain decorative items in which skilled craftsmanship is quite apparent. In the first category producers must decide whether to export products that are very inexpensive but profitable when sold in high volumes, or those that are more expensive and sold in smaller quantities. The middle ground between these two extremes is difficult for handicraft producers to enter, as in this range they are generally not able to compete with manufactured goods.



Demand is focused on utilitarian crafts that can compete with manufactured items.

Craftsmen who can supply the types of handicraft products now in demand should be certain that they can enter the market on a profitable basis--rather than at a loss--before they begin export production. Simply being able to produce a selection of samples of new sales items that interest foreign buyers does not mean that handicraft exporting can be a profitable business over the long term. If a craft supplier enters the export market before he has met the basic production conditions, he may destroy his markets prematurely, to say nothing of losing a great deal of money in the process. These basic conditions are discussed below:

Raw material supply--A producer should not enter the export market if he cannot be certain of obtaining the necessary raw materials for his crafts, at reasonable and consistent prices and in the quantities required. Craft materials are often natural products, which in some cases can be collected or even grown by the producer himself. However for those that he must get elsewhere, he should examine carefully before beginning production whether any future supply bottlenecks might arise. Unlike the manager of a large industrial operation, a handicraft producer seldom has the capital necessary to stock raw materials to hedge against a possible future shortage.

Volume of production--A craftsman must be able to produce enough of whatever he is selling to meet market demand. If a buyer of sandals, for example, requires a minimum sample order of 1,000 pairs--which is not an excessive amount--the producer has to be able to supply this quantity if he hopes to export his product. If his production capacity is insufficient to produce this volume, he is wasting his time trying to export.

Quality--The quality of handicraft production must be uniform and in conformity with samples supplied to the buyer. If an exporter delivers an order that is of lower quality, he may lose the entire market, as well as immediate sales.

Price--The product must be competitive in price with similar products. While a craftsman may be the only person in his country making a carved statue of an antelope, for instance, he is certainly no longer the only carver in the world doing so. If his carving cannot compete in price, he is wasting his time trying to export it. He may be able to compete successfully in quality, but this is important only if the buyer considers quality a major determinant in his purchasing decision.

Delivery deadlines--The producer must be able to supply the quantities required by the client's delivery deadline. This may sound easy, but often it is not. He must in particular be able to meet delivery deadlines for the major buying periods, for example for the Christmas season, as the distributor in the market has to assure that goods reach the retail store shelves before the selling period starts. To deliver according to schedule, the producer must maintain adequate stocks of his finished product. These stocks will often cost him a great deal of money to maintain and will tie up his capital. A supplier must also carefully assess the amount of time he needs to produce an item when he is determining his capability to meet delivery schedules. Articles that take too long to make should be eliminated from the export line.

Marketing Organization

Commercial buyers and private consumers are more discriminating in the way in which they purchase handicrafts since the boom of the seventies. They now know what types of craft articles are being produced and where to purchase them most easily and economically, a change that many craft producers are not yet aware of. Because of the highly competitive market situation, craft producers must therefore spend more time and money contacting potential clients to inform them of new products and to actively push sales. Developing a viable marketing structure for handicrafts is consequently one of the keys to successful handicraft exporting. Exporting is too complicated and expensive for most small craftsmen to handle on their own. It requires the filling out of many different kinds of forms, long waits at the customs office and a knowledge of packing and shipping requirements, not to mention the costs of actively promoting the product in the market. The expense of maintaining a packaging operation and inventories alone usually makes exporting prohibitive for the individual craftsman. Some of the marketing intermediaries used in the past, as discussed above, did not entirely meet these needs of craft exporters, so other alternatives should be considered.

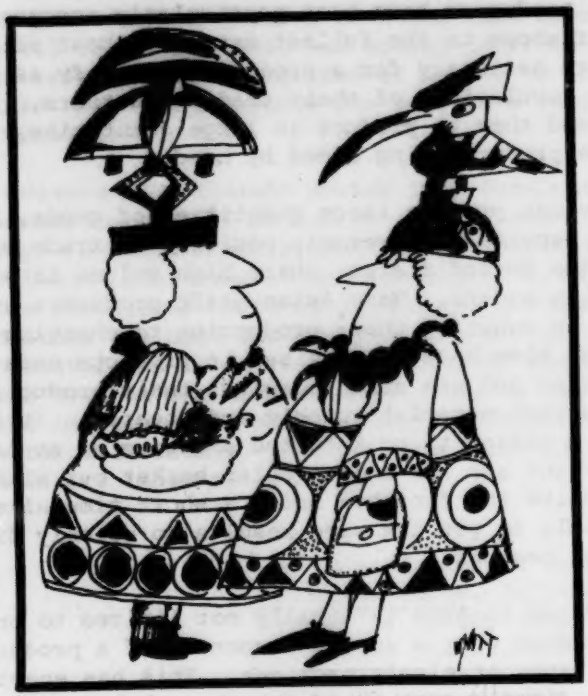
One possible marketing structure for crafts produced in developing countries is a national marketing board. Where such a body does not already exist, small producers can get together to form their own marketing association. The danger of such boards is that they tend to take so much of the craftsman's responsibility away from him that he is not longer in control of his own business. It is therefore crucial in any marketing structure that he be actively involved in all aspects of decision-making.

Marketing boards and similar associations are important for promoting sales. Few importers are willing to trade directly with individual producers, particularly producers who have never exported before, as many importers have had problems in the past of orders not being filled by individual suppliers. They feel much more confident in dealing with a professional marketing organization, and usually choose to do so when possible.

A handicraft marketing board should have representatives in key target markets to represent the interest of its members. A handicraft producer must know at what price to sell his product, to which consumers and which outlets to target his sales, and in which way to improve his product design. He can get such information only through direct contact with the market. Also, in order to sell aggressively, as is required in the current market situation, a craftsman should have a representative close to the buyer. A buyer will be more tempted to purchase if he can order by telephone and know that if problems arise with the order, someone can immediately deal with the situation.

In the past some craft exporters have relied on commercial representatives in the export market to perform some of these functions. However, a representative's primary interest is his own profit, not that of the various suppliers he represents, and he will generally concentrate on selling the products that bring him the highest returns. Therefore the best solution is either for the craftsman to be represented in the market by his marketing board or by himself.

The marketing boards of a few countries have set up showrooms in key export markets, as have a limited number of individual craft producers. Maintaining showrooms is expensive, which is the main reason that more exporting organizations have not established such facilities. However, a showroom is an effective way to promote craft items directly to buyers in the market and should be considered by more handicraft marketing organizations.



Crafts must be appropriate for the target consumer.

Example of the Asian Region

The largest exporters of handicrafts are some of the countries in the Asian region. Their success has been due in part to their ability to meet the various marketing requirements discussed above. Asian suppliers have been particularly successful in exporting utilitarian products, ranging from mats to furniture.

The primary reason for the success of Asian handicraft exporters has been their low-cost production. Because they have been able to pay low wages for skilled handwork, they have had an advantage over most other developing countries where, contrary to what is generally assumed, such labor is quite expensive.

Asian countries have also benefitted from a long tradition of business and trade. Their marketing organizations for handicrafts are well structured and highly efficient. Most of the major producing organizations either represent themselves in New York, Hamburg, or London, or have representatives working exclusively for them in these cities.

Asian craft producers have been particularly successful in mechanizing their workshops to the fullest extent without eliminating the degree of handwork necessary for a product to qualify as a handicraft under the import regulations of their trading partners. This mechanization has allowed them to produce in large quantities, with the final work on the product being added by hand.

Because they can produce large quantities of goods, Asian producers are in an especially favorable position to trade with the major markets such as the United States, where high volume is an important factor in obtaining orders. Many Asian craft producers are also extremely flexible in adapting their production to changing market demand. A number of them have specialized in products made from a particular raw material and are able to switch their production to other articles in that material quickly and cheaply. It is possible, for example, for a client to go into the showroom of an Asian producer in New York and ask for a particular basket but with modifications, and to receive the finished order a short time afterwards. It is almost impossible to get the same results so quickly from craft suppliers in other regions.

Craft production in Asia is usually not limited to one workshop. Some craftsmen produce only a single component of a product, which is then assembled in someone else's premises. This has enabled many more people to find employment than if each workshop worked on its own, and has also contributed to the degree of flexibility found in most craft businesses in this region.

Additional Benefits

It is possible, therefore, as the example of Asian suppliers shows, for developing countries to successfully export handicrafts if they survey the market possibilities carefully, select and develop appropriate products, and use effective marketing organizations. In addition to providing increased foreign exchange earnings, handicraft exports can support the national development process in other ways.

Crafts are usually produced in rural areas and can therefore help supplement farm income. Such additional income is particularly important when earnings from farm commodities are temporarily down because of low market prices or poor yields due to unfavorable weather conditions. When craft production has been organized within the rural sector, farmers can also often earn extra profits by selling agricultural waste products to local craft producers. Materials such as banana leaves, seeds and seed pods, for example, are frequently used to make certain types of craft products, and can simply be gathered and delivered for sale to the relevant craftsmen. In addition, a well established handicraft sector in rural areas can help alleviate the problem of migration from the farm to overcrowded cities, with all of the economic and social problems that such population shifts create. The attraction of moving to job-scarce urban centers is less when the prospects for earning a satisfactory income on the farm exist.

A well organized handicraft sector in a developing country can also help upgrade commercial skills in general among the local business community. Through craft production and exporting, businessmen can get experience in management and marketing, which can be transferred to more structured types of production such as large-scale industry. Meeting the high quality requirements of export markets in the craft sector can likewise help raise the standards of other consumer goods sold on the home market. This in turn may assist in dispelling the impression in many developing countries that foreign goods are better than locally produced items and thereby help cut down on unnecessary imports.

[Edited extract from International Trade Forum, July-September 1981, pp. 4, 22-26, International Trade Center UNCTAD/GATT, Geneva, Switzerland.]

Handicrafts (2): A Case of Promotion

Malcolm Benjamin

[This article describes the experience of a cooperative of wood carvers in Kenya which organized the craftsmen's marketing and undertook a successful promotional visit to three U.S. cities in 1980.]

Toward the end of 1980 Kenya's Akamba wood-carving cooperatives carried out a series of in-store promotions in the United States, under ITC's (International Trade Center) program of trade promotion oriented to rural development and assisted by the Kenya External Trade Authority (KETA), the country's national trade promotion organization.

The promotions resulted in a considerable increase in exports for the cooperatives and the establishment of a strong foothold for their products in certain segments of the U.S. market. The in-store events also benefitted Kenya's rural handicraft producers through the "market positioning" of their goods (that is, directing them at the most lucrative market sectors) in key cities in the United States, thereby increasing their export earnings potential.

This pilot promotional activity, which fits into Akamba's overall export marketing strategy, demonstrates how direct sales promotion of handicraft exports made by rural producers can be successfully carried out.

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Akamba's Marketing Strategy

The wood-carving industry in Kenya generates an estimated KSh20 million in earnings annually (approximately US$3 million), the major portion of which is received in hard currencies, either through exports or tourist purchases on the home market. A large part of this amount comes from sales by the Akamba carving cooperatives, whose 2,400 members comprise an extensive production force and account for a significant portion of the wood carvers in the country.

The historic seat of the carving community in Kenya is Wamunyu, two-hours' drive from Nairobi. Because they lacked marketing organization and know-how, many of the craftsmen in Wamunyu moved closer to the major market centers of Nairobi and Mombasa several years ago so that

One of the photos sent out in the press kit prior to the in-store promotional events.

their carvings could be more readily absorbed into the commercial mainstream. Encouraged by KETA, the cooperatives have since linked together into a commercial enterprise that has been able to respond to changing export market requirements and opportunities. With the planning and guidance of KETA, the wood-carving groups have also embarked on an active strategy to win a sizeable share of the profits from the direct marketing of their production, in contrast to the past, when the carvers themselves received only a small part of the profits from local and export sales because of the strong role of traditional middlemen and other intermediaries. In addition, the cooperatives' strategy of production coordination and aggressive market promotion promises to help stem the rural exodus and energize the carving industry in one of Kenya's least developed communities.

Common pricing and joint orders. One of the first steps that KETA took to help the Akamba groups set up a viable marketing strategy was to review their practices on pricing and receiving orders. KETA officials realized that the three carving societies, located in Wamunyu, Mombasa and Nairobi, had no common policies for pricing their carved items or amalgamating their production capabilities to meet market demand. The societies subsequently agreed to market their production at common prices and consolidate their efforts to meet expected export orders. A catalogue and price list were produced to enable the cooperatives to standardize product lines and to respond to the frequent market inquiries that KETA referred to them.

Discount policies were established to induce larger orders from major importers. Profits were calculated on the basis of a mix of sales to importers, distributors and retail stores. The strategy also instituted a firm policy of offering only high-quality merchandise to overseas markets to establish the name "Akamba Cooperative" as synonymous with quality and style.

Positioning. "Handicrafts" is an ineffective product designation for marketing, as this is a term that at best describes only the production technique for the product. For merchandising executives and buyers, "handicrafts" often has a derogatory connotation, associated with nonstandardized merchandise, erratic deliveries and little commercial know-how. While woodcarvings fall within the category of handicrafts, KETA advised positioning the hand-carved product lines within saleable merchandise categories, i.e. giftware, decorative accessories, and housewares (for functional merchandise), and adapting some of the products for the Christmas ornament and "notions" (small items used in sewing) departments.

Choosing target markets. Market research showed that the per capita imports of Kenyan wood carvings into North America were among the lowest for Kenya's major markets of these items, and therefore considerable potential existed for expanding that market. Other indicators that pointed to selecting the United States as a target market were:

1. The high per capita earnings of the U.S. population and the favorable income spending patterns of consumers.
2. Good potential for the purchase of carvings for use in the American home.
3. An affinity with the product and interest in it by American consumers of African origin.
4. An interest of the American public in "Africana" (i.e., African-type artistic and other objects).
5. The little previous market development work by Kenya for carvings in the United States.
6. The existence of duty-free treatment for carvings under U.S. import regulations.
7. The use of English as the common language for commercial transactions.
8. Good facilities for transporting the goods from Kenya to the United States by sea, air and post.
9. Favorable payment practices in the United States on import orders.

Market Entry

Overseas trade fairs and buyer-seller meetings are one of KETA's prime tools for exploring new markets and making commercial contacts abroad. As a result of extensive correspondence with major U.S. buying and merchandising organizations, KETA arranged a product review at their stand at the International Trade Fair in Milan, Italy, in 1977, with a merchandising specialist from the Associated Merchandising Corporation (AMC). AMC is a group of 47 major retail store chains throughout the world affiliated into a buying network. The group has set up special committees composed of experienced buyers who review all new merchandise for fashion, function, durability, safety and price. Goods that meet the rigid criteria of the committees are sent to the annual buyer meetings for review and order commitments.

The AMC executive reviewed the big selection of handcrafted Kenyan merchandise on display in Milan and selected a number of product lines for in-depth market appraisal by buyers and AMC merchandise specialists. Feedback came several months later, along with the first orders from buyers indicating that the Akamba wood carvings were widely accepted by the retail stores in AMC's network.

This initial contact has led to a continuing program of new styling and product development for sales to the AMC affiliates. During the past three years the Akamba Cooperative has developed product lines for the AMC stores for their gift, decorative accessories, houseware, Christmas ornaments and toy departments. Before orders are placed, the new lines must pass a critical screening by AMC merchandise representatives and the select committees, and then be presented to the annual buyer assemblies. In early 1980, buyers and fashion directors representing a majority of the AMC stores met in Europe to place orders for their 1980 direct imports. By April of that year, the Akamba Cooperative had received firm orders from 17 North American retail stores for over $30,000 worth of carvings for autumn delivery and Christmas period sales.

In-Store Promotions

The success with which Akamba had obtained a foothold in the market led both the cooperatives and the AMC buyers to examine how the market position of the group could be further strengthened. Suggestions from the stores focused on direct promotional events. Akamba received numerous requests from buyers and design coordinators for visual and background material to be used in store displays of Akamba carvings. A number of top merchandising executives also suggested to KETA that in-store demonstrations by a master carver would be welcomed by retailers who wished to offer their customers the experience of seeing the sculptures being carved and thereby stimulate demand for these items.

In-store promotions can be held for several purposes: to launch a new product line, feature special merchandise, accelerate sales of an exclusive or well priced line, and enhance the image of a store. In the case of Akamba carvings, a promotion could serve all four purposes, as in some of the stores concerned the carvings could be introduced for the first time, while in others they were already being sold and could be further promoted. A series of "live promotions" as suggested by some of the merchandising executives could feature demonstrations of how the products were made, and Kenyan staff could also be on hand to introduce the products personally to the consumers.

Cost-benefit analysis. The cooperative decided to give the idea of a series of promotions serious consideration. In collaboration with KETA, the cooperative's officers carried out a cost-benefit analysis, listing the objectives of such a series of promotions and the estimated costs of staging the events. The benefits anticipated included:

1. Obtaining additional orders from stores participating in the promotional events.
2. Receiving practical, on-site training for the Akamba management in preparing and carrying out promotions in foreign markets.

3. Getting media exposure for their art through advertising placed by the stores to promote the event.

4. Getting insights into consumer buying patterns for use in planning future production.

5. Carrying out market testing of new product styles at the consumer level.

6. Analyzing the range of retail prices to be used in calculating future wholesale prices and discount policies to increase the returns to the cooperative.

7. Expanding the positioning possibilities of Akamba carvings by enhancing their image as important fashionable merchandise.

Major costs for a promotion of this type are transportation (local and international) for the demonstrator and team, plus lodging and meal expenses during the tour. KETA estimated that the minimum direct costs to the cooperative would be $4,000, including tourist-class air travel, travel by bus within the United States and lodging at modest hotels during the three-week tour. Based on the initial orders placed by the AMC stores, the projected tour costs could be considered a 13% contribution to the sales promotion if funded by the cooperative. Because of the advantages that the series of promotions appeared to offer, Akamba proposed it as a pilot activity to KETA. ITC provided funds to stage the event and to train a KETA marketing officer in retail store promotions.

Selecting stores. The stores to be chosen for the series of promotions had to comply with certain conditions if the tour was to be a success:

1. The stores would have to have enough merchandise on order to warrant a three-to-four day promotion. It stands to reason that, for a merchandise promotion, the retailer must have an adequate stock on hand to get the most benefit out of the event. If the exporter is covering a large proportion of the costs, as was the case with the Akamba promotion, it is an accepted practice for him to request a minimum purchase of his goods. In this way a promotion offer will induce larger orders, and the exporter can calculate his promotional costs as a percentage contribution, as Akamba did. Ideally the cost of the promotion or cost of sales should be calculated in the export price.

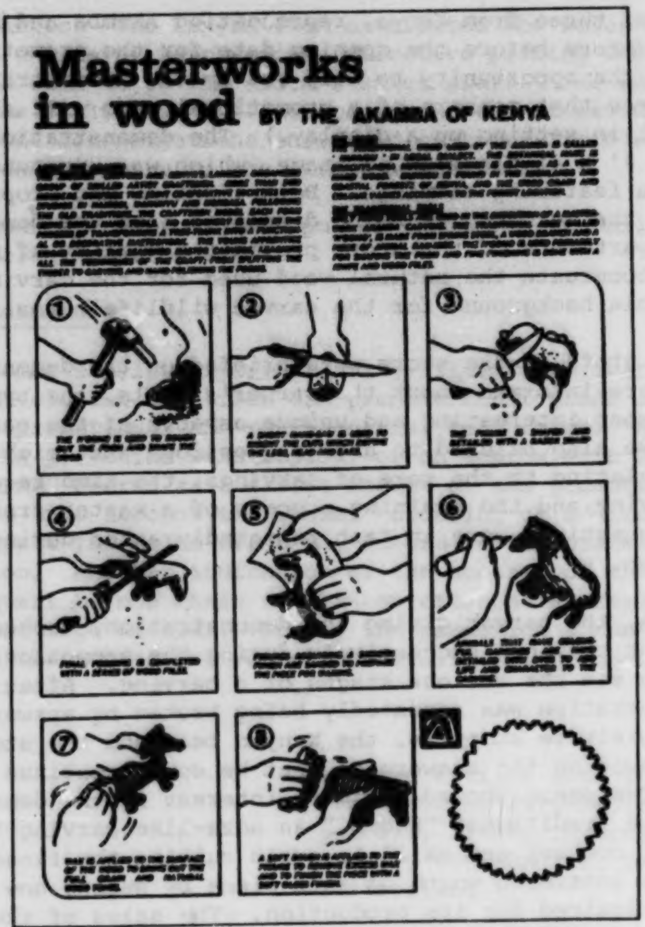
2. The stores would need to place appropriate advertisements in local newspapers and magazines to publicize the event. Advertising is usually required for such promotions, and retail establishments generally have a special department that prepares the advertising copy and artwork. The exporter is expected, however, to supply the advance material to be used by the store's advertising and special events department.

3. The stores would be required to accept the cooperative's time schedule and agree to fixed dates, allowing reasonable travel time between cities and an itinerary for the group that would not involve backtracking and therefore extra costs. The most economical promotions keep a team moving from store to store to minimize their lodging and subsistence expenses.

With the assistance of AMC's London and New York offices, plans were formulated to include three prestigious AMC affiliate stores in Akamba's promotional tour. The selection was made to allow the cooperatives to get a good geographical spread for their marketing efforts. With ITC's financial backing, the Akamba committed themselves to the promotion on a no-cost basis to the stores.

Publicity material. Special promotions are usually highlighted by advance advertising in newspapers and store bulletins, posters and point-of-sale displays, all geared to increase customer traffic to the store and to a specific department within that store. Merchandising specialists recognize that the advertising for a special event of this type can result not only in direct sales of promotional merchandise but also spin-off sales of other goods from impulse buying.

In this case, the cooperative agreed to supply the stores with promotional materials that could be used by their advertising and special events sections to prepare such publicity programs before the Kenyan team arrived. The press kit compiled by the cooperative and KETA included enlarged photographs of the artist-craftsman who would be giving the carving demonstrations, color slides of carvers working in Kenya, and a drawing of how the carvings evolved from a section of log to a piece of finished artwork. Story tags and stick-on labels were produced to provide point-of-sale support for the merchandise. Background material on Peter Muia, the carver, and on the cooperative was included to aid the writers in composing copy for their advertisements.


Masterworks in wood BY THE AKAMBA OF KENYA

Fact sheet in press kit showing the evolution of the carving.

The First Stop

The first store on the tour was one of a large and well-known chain in Washington, D.C. The store's giftware buyer, who before the promotion had already been successfully selling Akamba carvings, worked with the cooperative to make the promotion an important store event. Her merchandise selection was based on her evaluation of past sales performance. At the time of committing the store to the promotion, she had placed additional orders for both back-up stock and an assortment of ethnic and functional styles to add strength to the display.

The team of three from Kenya, representing Akamba and KETA, arrived at the store before the opening date for the promotion, which gave the group the opportunity to help set up the demonstration area. (Protocol assumes that members of a promotional team will assist store personnel in setting up a display.) The demonstration area consisted of a 4' x 4' platform or stage, which was surrounded by display islands featuring carvings. Both lighting and props are important to tie the merchandise being displayed into the demonstration. The display departments of the store provided a variety of natural materials to accentuate the natural wood used for the carvings and to create a suitable background for the carved wildlife forms.

The sales staff of the store were briefed on the demonstration sequence and were informed about the carver's tools, the type of wood used, and the most interesting and unique aspects of the carving process. They were also briefed to answer questions that might be asked by customers relating to the care of carvings, the time required to complete a carving and the training process of a master craftsman. Most of those questions were in fact repeatedly asked during the actual promotion.

Peter Muia, the carver giving the demonstration, worked on a number of different carvings successively during the promotion so that customers could see the various stages of a carving. After he found that his concentration was repeatedly being broken by answering questions from inquisitive shoppers, the Kenyan team and the store's sales staff began providing the answers so that he could continue his work undisturbed. Customers showed the most interest in the demonstration when he used the traditional "ngomo," an adze-like carving tool that calls for great control and skill to avoid cutting the fingers. They could judge the intrinsic worth of each piece by seeing how much skill and time were required for its production. The sales of the carvings were therefore boosted because customers appreciated the difficulty of the task and the adept skills of the carver.

During a promotion of this type, the actual transaction of a sale is the domain of the store's sales staff. In this case, the group from Kenya were on hand to answer questions and observe customer reaction to the demonstration and merchandise. Peak store traffic in the United States is often at lunchtime (between 12 a.m. and 2 p.m.) when people who work have time to shop. The Akamba demonstrator and promotional team therefore worked during the peak shopping hours.

The results. The demonstrations in Washington, D.C., were conducted in four of the chain's stores. A computer printout tallied from cash register sales indicated that the promotion not only sold most of the Akamba merchandise on the spot but also stimulated sales in the stores' entire gift departments as a result of the increased customer traffic. The Kenyan team attributed the sales success to the buyer's choice of merchandise, effective pricing and display planning, as well as to the store's sales staff. The advance advertising in *The Washington Post* newspaper and the storewide posters announcing the demonstrations increased customer traffic to the gifts department and exposure to the Akamba merchandise.

Subsequent promotions were put on in stores in Dallas, Texas, and Los Angeles, California.

The Sales Results

The Akamba's pilot export activity illustrates that rural producers in developing countries can promote their goods abroad through appropriate promotional and merchandising techniques. New sales stimulated by the promotion were $8,000, or an approximate 26% increase in sales to AMC stores as a direct result of the promotion. This figure takes into account the stores' ordering of additional merchandise to support the sales event and re-orders immediately following the promotion. Another indication of the success of the promotion was the request by one chain to plan an extended storewide promotion of Akamba carvings in 1981. During the promotion a number of importers visited the stores and requested details about importing the Akamba lines.

[Edited extract from International Trade Forum, July-September 1981, pp. 5-7, 27-30, International Trade Center, UNCTAD/GATT, Geneva, Switzerland.]

customer traffic. The Kenyan team attributed the sales success to the buyer's choice of merchandise, effective pricing and display planning, as well as to the store's sales staff. The advance advertising in the Washington Post newspaper and the storewide posters announcing the demonstrations increased customer traffic to the gifts department and exposure to the Kenyan merchandise.

Subsequent promotions were put on in stores in Dallas, Texas, and Los Angeles, California.

The Sales Results

The Kenyan's pilot export activity illustrates that rural producers in developing countries can promote their goods abroad through appropriate promotional and merchandising techniques. New sales stimulated by the promotion were $6,000, or an approximate 70% increase in sales at the stores as a direct result of the promotion. This figure takes into account the stores' ordering of additional merchandise to support the sales event and re-orders immediately following the promotion. Another indication of the success of the promotion was the request by one chain to plan an extended storewide promotion of Kenyan handicrafts in 1972. During the promotion a number of importers visited the stores and requested details about importing the Kenyan items.

[Edited extract from International Trade Forum, July-September 1971, pp. 7-9, 37-40, International Trade Centre, UNCTAD/GATT, Geneva, Switzerland.]

AQUACULTURE

MARINE AQUACULTURE.
OYSTER CULTIVATION IN SUDAN.
(PHOTO: FAO--W. REED)

A Role For Aquaculture in Rural Development

S. Z. Qasim

[Aquaculture, the farming of aquatic plants and animals, can be a source of food. Its development can generate additional food resources and improve the standard of rural life in a number of Third World countries. The physical and economic problems are discussed and the major types of marine aquaculture practices are outlined.]

Similar to the utilization of land for multiple cropping, there is a vast scope for using the backwaters and estuaries adjoining the coasts of India for farming of aquatic plants and animals. This type of farming, known as aquaculture, has recently come up as one of the very useful ways of generating extra food resources. Aquaculture employs certain principles of animal husbandry to gain control over the animals and their liquid environment. A site for aquaculture must have certain prerequisites, like sufficient depth of water, suitable temperature, optimum salinity, and fertility of water.

In agriculture, only the topmost soil, some 30 cm thick, which is subjected to the vagaries of nature, contains most of the food production. In aquaculture, the entire water column from the surface down to about 100 meters depth, depending upon the clarity of water, is available for cultivation. This means that the available space for the cultivation of aquatic organisms is many times greater than the available space for agriculture or animal farming on land. Moreover, it is easier to grow aquatic animals for food because they are of the same density as the medium in which they live and require only water bodies as their habitat, unlike the sheltering and supporting structures required by

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the land animals. In some parts of the world, aquaculture has surpassed even the labor productivity attained in poultry farming by production of over 220,000 kg of meat per man per year. Another important factor in favor of aquaculture is that most of the crops produced have high quality protein.

Some of the aquatic organisms are known to be better converters of plant food than the land animals. Filter-feeding fishes and molluscs subsist on microscopic plankton, which cannot be used directly by human beings. Most of the fishes and other aquatic animals are cold-blooded and hence do not expend their energy for thermoregulation. It has been estimated that the accumulation of flesh in some of the fishes--like carps--per unit of assimilated food is 1.5 times as rapid as in pigs or poultry and twice as rapid as in cattle and sheep.

Problems in Aquaculture

If aquaculture has such a vast potential, why has its development been so slow? The reason is partly that, because water rather than air is the environment in which the organisms have to be reared, aquatic animals largely remain unseen. One operational problem is that the extra food materials and other metabolic products do not degrade as fast in water as in the air, and therefore the water gets easily polluted. This necessitates either continuous flushing, which requires an over-abundance of water, or rather expensive recycling schemes. Another difficulty is that in the young stages aquatic animals undergo major transformation from hatching to the adult stage; during this process, they neither resemble their parents nor consume the same food as the parents. Thus the rearing of aquatic animals from herbivores to carnivores, or *vice versa*, requires additional labor, skill, and special installations. These practices normally accelerate the ecological cycles which, in turn, lead to faster accumulation of waste materials. These materials have to be eliminated through technological means, which requires more economic inputs. Thus, the product of aquaculture ultimately costs more per kilogram than the naturally occurring fish population obtained by fishing in the sea. Another disadvantage of the aquatic medium lies in the fact that water is a universal solvent, which makes any preventive step against physical and chemical contamination of water very difficult.

Evidently, aquaculture, at least in the near future, is not going to replace fishery, but it would definitely supplement it.

It is clear from some of the facts noted above that, although the total theoretical yield of aquaculture is very high, the realization of this potential in practical terms will require suitable innovations and fairly advanced technology. The future of large-scale aquaculture, therefore, largely depends on a realistic appraisal of our land and water management methods.

Economic Viability

The economic viability of aquaculture would depend on a large number of interacting factors, which are more often sociological than technological and vary from region to region. The degree of success achieved also varies with the particular species used for culture from one location to the other.

Commercial aquaculture can be evaluated and compared in terms of the quantity produced in relation to the human effort expended. But the lack of adequate cost accounting and the difficulty in obtaining reliable information make such a comparison problematical. Aquaculture in low-income countries tends to remain a part of mixed subsistence or near-subsistence farming which defies conventional economic analysis. However, the yield per unit of labor input in aquaculture is found to compare favorably with pig and poultry farming. There is no doubt that commercial application of newly developed, highly automated methods of feeding and harvesting will greatly improve aquacultural production efficiencies.

The slow development of aquaculture in many developing countries is not so much because of shortcomings in the application of modern techniques as due to lack of funds, slow capital formation, lack of credit facilities, poor administration, and inadequate infrastructures like roads and markets. The success of aquaculture depends on the marketability of the product and the efficient use of natural factors. As in agriculture, the crucial thing in aquaculture is the degree of technical and managerial skill possessed by the aquaculturist. In fact, aquaculture generally requires a higher level of managerial skill than agriculture.

In most of the littoral countries of the world, aquaculture is being given priority for research and development. From the studies conducted so far it has become clear that successful aquaculture requires a complete mastery over the entire life cycle of the organism used as "crop." Control over reproductive biology, knowledge of food habits and mode of nutrition, types of diseases, availability of economically sound techniques of aquacultural engineering are some of the factors which would determine cost-benefit ratios.

Aquacultural Practices

Depending on the degree of human effort and the capital expended, aquacultural practices can be divided into the following main branches:

1. Transplantation of organisms from poor to better growing areas; this is the least capital-intensive form of aquaculture.

2. Transplantation of young animals after their initial rearing: this practice normally contributes significantly to conventional fisheries.

3. Trapping fish and invertebrates in special enclosures and allowing them to grow there until harvested: this can be further intensified by using fertilization techniques or by installing devices to control the flow of water.

4. Gaining complete control over the reproduction of the animals, and using artificial enclosures for rearing them from larval to adult stage (hatchery technique): the yield in this case can be greatly intensified by giving artificial feeds.

5. Raft culture of sessile invertebrates (those attached to a base) and several varieties of seaweeds: this form of aquaculture probably gives the highest yield.

In all these operations, such biological factors as reproductive habits, requirements of the eggs and larvae, feeding habits, and adaptability to over-crowding must be taken into consideration in addition to size, availability, and nutritive value of the organisms to be cultured. Breeding of the species in captivity is not strictly necessary for aquaculture. It is generally found that animals which produce fewer and larger eggs have larger and hardier larval forms, and these are more suitable for culture purposes.

Products of Aquaculture

About 5 million tonnes of food is at present being produced by aquaculture in the world from approximately 400,000 hectares of aquatic areas under cultivation. The organisms which are being cultured come under the groups of fishes, crustaceans, molluscs, and seaweeds. In developing countries like India it has been suggested that herbivores or plankton-feeders are most suitable for aquaculture, because their harvest in terms of surface area or volume of water, their utilization of raw materials like solar energy, and their natural or artificial fertility are greater than those of carnivores.

In India, the culture of milk-fish has been found to be rewarding, but yields are not as high as in Taiwan where the maximum yield of milkfish (1,000-2,500 kg/hectare) has been obtained by stocking and restocking at different intervals. Similarly, mullet culture is of considerable importance to several countries including India. The culture of eel also seems to have good possibilities in India, because of its being an important export item. Several other fishes, tolerant of large changes in salinity, are suitable for cultivation in estuaries and backwaters.

Crustaceans form another important group of marine animals suitable for cultivation. Shrimp culture is being undertaken in many countries, either by natural or controlled stocking. In Japan, the yield of cultured shrimp is more than 2,000 kg/hectare. In certain parts of India, shrimp culture has proved to be quite profitable, even by traditional methods. Lobsters and crabs are other important crustaceans which can be cultured with improved techniques.

So far, in India, maximum success has been achieved in the culture of molluscs. Mussel culture on ropes has given spectacular results. Similarly, the culture of clams, edible oysters, and window-pane oysters can also be undertaken in suitable nets with success. In recent years, the culture of pearl oysters on wooden rafts using sandwich-type frame-nets has given excellent results; it is now possible to produce cultured pearls from these oysters on a commercial scale using indigenous technology. [See photo p. 97.]

The culture of seaweeds on coir ropes and wooden frames has also given promising results, and many seaweeds of economic importance can now be cultivated on a fairly large scale. Similarly, the culture of several other organisms--sponges, holothurians (sea cucumbers, etc.), turtles etc.--can also be attempted in India.

Scope for Development in India

India has vast aquatic resources well suited for aquaculture. However, in order to popularize aquaculture, nation-wide demonstrations are necessary to explain the principles involved and the monetary returns to be expected from culturing of selected species. Another promising approach could be the utilization of treated sewage for producing fish, and the use of wastes from industrial complexes like fertilizer factories for culturing several edible varieties of aquatic animals.

The slow pace of development of aquaculture in rural areas is largely because of shortage of capital, lack of skilled personnel and the use of outmoded techniques. These factors collectively reduce the yield from aquaculture and make the village folk hesitant to adopt aquaculture as their mode of livelihood. In the field of aquaculture, we have yet made only a beginning, and once the new innovations of sea farming reach the rural areas of our long coastline, aquaculture could become as popular as poultry farming. By introducing successful aquaculture we should be able to generate considerable employment potential in our rural areas which would add to our economy substantially.

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The Planning of Aquaculture Development

T. V. R. Pillay

[This text examines the basic considerations in planning aquaculture development and is intended to assist administrators and investors in making appropriate decisions on the form and level of the industry to be supported, the infrastructure to be developed, and the investments to be facilitated.]

Worldwide interest in the development of aquaculture has led to many attempts to assess the potentials in different countries and to some "soul searching" for the causes of past successes and failures of production programs. Many symposia and seminars held on aquaculture have stressed the significant role of a development strategy in the establishment of large-scale aquaculture operations. Such a strategy has to fit into the general fishery development plan, the overall economic development strategy of the country, and the socio-economic and political realities that shape government policies. Without a well planned strategy and coordinated action to deal with the major constraints to the development of the industry, orderly and rapid progress cannot be expected. Although the technical aspects of aquaculture have been and continue to be discussed by expert groups, the planning of the industry has not received more than cursory attention.

Aquaculture practices range from the propagation of aquatic organisms under complete human control to the manipulation of at least one stage of an aquatic organism's life before harvest for the purpose of increasing production. A prerequisite to any aquaculture planning is a clear conception of the need and the purpose of

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developing the industry in a particular region or country. Although in a small number of countries (especially landlocked ones) aquaculture could be the main source of fish supplies, in the majority of countries it is at present only a supplementary source of aquatic foods, however great its size. But there are many factors that tend to increase its importance, especially the levelling off of the catches of wild stocks, the need for creating new fishery resources within national jurisdictions due to impending changes in the law of the sea, and the "energy crisis" that makes it imperative to concentrate on methods of food production which use less fuel.

Aquaculture is presently practiced for the purposes of:

(a) producing human food,
(b) improving natural stocks through artificial recruitment,
(c) producing sport fish,
(d) producing bait for commercial and sport fishing,
(e) producing ornamental fishes,
(f) recycling organic wastes, and
(g) producing industrial fishery products--e.g. for reduction to meal or fertilizer; seaweeds for marine colloids like agar (a jelly-like substance used in laboratories), oysters for cultured pearls.

Among these, aquaculture for human food production has decidedly the maximum importance in most countries of the world, whether it be for increasing or improving consumption within the country or for export to earn foreign exchange.

Efficiency in food and protein production. Poikilothermic (cold-blooded) animals, especially fish, using little energy for maintenance of body temperature and for normal locomotion, have relatively low energy requirements except for metabolism and maintenance of body functions. When fed on balanced diets under favorable environmental conditions, their rate of conversion of food to gain in body weight can be very high. For species like the channel catfish *(Ictalurus punctatus)* and rainbow trout *(Salmo gairdnerii)* food conversions are often 1.0 to 1.25 (weight gain of 1 to 1.25kg for every kg of dry food consumed). Live weight gain per unit of food intake and corresponding protein gain are higher in fish than in poultry, swine, sheep or steers. The protein efficiency ratio (weight gain per unit of protein intake) is either equal or higher than in poultry and higher than in swine, sheep and steers. Fish are able to utilize high levels of protein in the diet, whereas in poultry almost one half of the amino acids are lost for protein synthesis; a weaner pig may lose as much as two-thirds of the amino acids through deamination. Fish and shellfish are thus very efficient converters of proteins (including plant proteins) into high-quality human food.

A typical small-scale fish farm in the Congo (Brazzaville)

From the point of view of the economics of production, comparative studies with cultivation of wheat, rice and millet in India show that profit per unit weight of produce can be 3 to 40 times higher in fish culture. Similar comparisons with the cost of production of beef, poultry and pork in Hungary show that fish production costs are the lowest, being 49, 30 and 2 percent less respectively. Recent increases in food production costs due to the energy crisis may place aquaculture in a much more favorable position. The cost of fish production, of course, varies with the species cultivated and the system of culture adopted, and is much influenced by the availability and cost of inputs to production centers. As a general observation, it could be said that herbivores and omnivores among fish and shellfish are less expensive to produce than carnivores.

Economics and production objectives. The economics of aquaculture, particularly the return on investment, varies considerably, depending largely on the efficiency of operations and market conditions. Although readily available information on these aspects is still limited, there have been a number of studies on this subject in recent years which clearly show that well-planned and properly operated aquaculture compares very favorably with similar food production industries in their internal rates of return.

Whether aquaculture should aim at the production of cheap food for the common man or high-priced food for the luxury market or export, is a decision to be made in a country with due regard to its policies and development objectives. It has to be remembered that food habits and preferences are very strong among the poorer classes, and possible changes can only be brought about gradually through market promotion. One way to develop cheap food is to use low-valued species raised by large-scale aquaculture for processed products in which convenience food value and acceptability of finished products are more important than the species used. This is easier to do in countries where there is already a market for convenience foods, especially in industrialized countries where the food industry has the capacity to promote marketing of new products (even disguising the species to counter consumer prejudices when necessary). While this possibility certainly has to be kept in mind, experience so far definitely indicates the need to base such industries, at least initially, on readily acceptable products. Another important consideration is that a high-cost product today may cease to be so with improved technology and the expansion of mass production. An oft-quoted example is poultry, which was a relatively expensive meat in Europe before the present-day production techniques came to be adopted.

Aquaculture development may be undertaken for different purposes in different situations, of which food for the poor is not the only possibility. It may be to meet the increasing demand for a high-valued species, or make good the fall in production of such species from natural sources. It could be to increase exports or to supply import substitutes, and thereby to improve the country's balance of payments. Or it may have the prime objective of generating rural employment and preventing the drift of rural populations to the cities. Thus it may be oriented to contribute to the overall economic development of a country in several ways.

Present Organization and Status of Aquaculture

Originating as a subsistence-level farming operation and still continuing to be so in some areas, aquaculture has in most cases developed into small-scale enterprises. Even the multi-million dollar catfish, trout, milkfish and oyster farming industries consist of many relatively small units. Vertically integrated industrial-level aquafarming is relatively rare, although there are clear trends toward the establishment of such, particularly in developed countries. Naturally there are many intermediate organizational levels to be found. Farm size may vary from less than a hectare of pond surface to a thousand or more hectares owned and operated by individuals, co-operatives, government corporations or private companies. The enterprise may be solely devoted to the production and sale of seed or baitfish, or for the production of aqua-foods (including sport fish), industrial products like pearls, or raw material for other industries like agar and marine colloids manufacture.

Most of present-day aquaculture is oriented to the production of human food. The systems of culture adopted may be extensive or semi-intensive. Extensive cultivation normally involves large areas, low levels of capital investment per unit of area, low operating inputs and supervisory management, and low yields per hectare. They tend to be labor-intensive (relative to other costs). Intensive systems are characterized by dense stocking, stock selection and manipulation, intensive management and environmental control, partial mechanization of operations, and high production per unit of area or volume of water. In the process of development the level of operations may gradually evolve from extensive to semi-intensive or intensive methods.

Aquaculture operations are often combined with agricultural or animal production activities, and this is considered particularly important and essential in integrated rural development programs. In view of the similarities in operational procedures and production concepts there is much to be gained by close collaboration, including the sharing of common services. It could be of great advantage if some of the privileges and incentives offered to agriculture and animal husbandry were extended to aquaculture. However, being essentially a sector of fishery industries, aquaculture has historically been a part of fisheries in terms of governmental attention and policy making. In spite of differences in the primary phase (culture as against capture methods employed), the secondary and tertiary phases of the aquaculture industry are so closely linked with the fishing industry and so often inter-dependent that the organizational advantages of integration are obvious.

Comprehensive statistics of aquaculture production are not available, and the last global estimate was made in 1975. According to this estimate the world production through aquaculture (excluding sport, bait and ornamental fish and pearls) in 43 countries for which data are available was as follows:

	Production in thousands of tons
1. Finfish	3,981
2. Shrimps and prawns	16
3. Oysters	591
4. Mussels	329
5. Clams	37
6. Other molluscs	93
7. Seaweeds	1,055
	6,102

Most of the finfish, shrimps and prawns produced today are from small-scale operations. Oyster and mussel farming, as also seaweed farming, are generally based on larger units. Recent general surveys in some countries have shown that both types of operations are expanding fairly rapidly, with reported increases in production of up to 50 percent in some countries.

Small-Scale Rural Aquaculture

Aquaculture can be organized in different patterns and at different levels of sophistication or intensity of operations. Two major categories of organization can be identified: (a) small-scale rural aquaculture, and (b) large-scale, often vertically integrated, aquaculture. It should be pointed out that this can only be a very loose classification as many intermediate-level organizations exist. Only the former will be discussed here.

Small-scale rural aquaculture would include a high percentage of the present-day fish culture, ranging from subsistence-level farming by individual farmers to small production units operated as a part-time or off-season occupation by small farmers or fishermen. This level of operation lends itself very well to integration into a rural economy and can have an important role in overall rural development. Aquaculture can often be combined with agriculture and animal production with great advantage. Paddy-cum-fish culture, and duck-or pig-cum-fish farming are established practices in some parts of the world and have proved to be highly beneficial, yielding increased overall food production as well as enhanced economic benefits to the farmer. The bunds (earth walls between the fish ponds) and embankments of fish farms may provide suitable sites for intensive horticulture. In many densely populated areas, the bunds may be used for the cultivation of cassava, sweet potatoes, Spanish peppers, green beans, melons, bananas, etc. Bunds and embankments of pond farms may also be used for growing

A homestead fishpond in Indonesia

different types of fruit or shade trees. The ponds themselves may serve as reservoirs for irrigation of fields and gardens and watering livestock. Excess silt from ponds is often used as a fertilizer for crops. In some countries the ponds may be used also for the cultivation of aquatic vegetables like water chestnuts *(Trapa sp.)*. Thus, small-scale aquaculture is well suited for integration with other rural activities and can contribute substantially to the income of farmers.

Small-scale aquaculture is generally more relevant when the main objective is the socio-economic development of rural areas. Such development has a greater chance of benefiting the small farmer. Capital and operating costs of such small-scale operations may be within his reach, and the necessary labor could be provided by his family members, with occasional assistance of hired hands. Aquaculture could be the sole or part-time occupation of the farmer, and the benefits from the operations would largely remain with him. If the scale of farming is adequate to ensure a reasonable income to support a decent standard of living, it can very greatly contribute to the amelioration of a major social problem of developing countries, the migration of people from rural areas to the cities.

In the overall fish or aquafood production programs, the production from a large number of small-scale units can be as much or more than from a small number of large units. The success of a pattern of small unit development would depend, to a large extent, on the supporting services that can be provided.

Support services for small-scale fish farming. In the majority of cases the necessary services for small-scale units will have to be provided by the government, covering the production, distribution and marketing phases. Such assistance could be channelled through village or community development programs where they exist. They can also be organized through cooperative organizations which have the necessary capital and management capabilities. The public sector involvement will obviously be considerable, and would be justified more by the socio-economic benefits derived by the community as a whole than by the financial profits obtained against investment.

The nature of services required may vary considerably among countries and systems of culture, but the need for technical assistance and extension services is common to all of them. The success of small-scale rural aquaculture will very largely depend on the quality and ready availability of extension services. The extension service has to serve as a link between the farmer and the experiment stations or pilot-scale farms to enable application of the most appropriate technology in the field, and to provide technical guidance and advice promptly as and when the farmer needs them. The quality of its personnel, especially their technical competence and ability to command the respect and confidence of the farmer, is of special importance.

In subsistence-level farming, the construction of ponds or other aquaculture installations will be done by the farmer himself and his family, which is generally time-consuming. When the scale of operations is big this becomes considerably less economical. Since the mechanical equipment required for pond construction may be beyond the means of small farmers, a central pool of equipment like draglines, bulldozers, pumps, etc., with the staff required for their operation and maintenance will be of considerable help, and in many areas a necessity. The assistance required for site surveys and design of installations can be made available either through the extension service or through trained staff attached to the equipment pool. Some of the installations like water controls for fishponds, cages for cage culture, materials for spawning beds for oyster farming, etc. can be fabricated in such a central unit for distribution to farmers at reasonable prices.

Pond construction using manual labour in Nepal

Timely supply of good quality "seed"--fish eggs or sperm--in adequate quantities is one of the most important requirements of aquaculture. In small-scale operations it may often be difficult and inefficient for every farmer to produce seed on his own farm. Centralized production of seed in hatcheries or rearing centers, where it will be possible to develop and distribute improved strains, can be a major service to small-scale aquaculture enterprises. Next to seed, the most important inputs in aquaculture may be feeds and/or fertilizers. As long as the farmers depend only on supplementary feeding, especially with domestic and farm wastes, specialized feed manufacture will not be needed. But when intensive farming with complete or supplementary feeding is adopted to improve production and economic benefits, it becomes essential to provide for efficient production and distribution of appropriate feeds, in most cases compounded feeds.

Feeds for aquaculture organisms can be manufactured on a large scale in feed mills in combination with the manufacture of livestock feeds, in which case the needs of small-scale aquaculture can be met by building up appropriate storage and distribution systems in the rural areas. Commercial production of feeds for aquaculture is at present limited to only a few countries and serves the culture of a small number of species or groups of species, such as salmon, trout and American catfish. Experience has shown that small-scale production of compounded feeds using locally available feed ingredients on a cottage industry basis is feasible, and can be undertaken with only limited capital investment. Individual farmers operating moderately large areas may find it possible to produce the necessary feed to meet their own requirements, but the really small units will need centralized feed production.

Suitable means of distribution of other essential requirements for aquaculture, such as the chemicals and drugs used for disease control, pond sanitation, predator and weed control, will have to be organized on a cooperative basis, or as a service sponsored by the government. Expert advice and assistance in the diagnosis of diseases and causes of mortality of culture stock, and prompt implementation of control measures, are of great importance to farmers, and in most cases these will have to be organized by the government. In fact, the government should establish a system of regular health inspection of cultured stock by qualified specialists to ensure freedom from dangerous infections in culture installations. Such an arrangement is of particular importance when the stock has to be exported and has to be certified by competent authorities to be free from communicable diseases.

Marketing of produce. Suitable marketing arrangements are essential for both small- and large-scale aquaculture enterprises, and again governmental or similar assistance will have particular significance in small-scale farming. Marketing requirements and demand potentials have to be estimated as a preliminary step in planning development programs. Aquaculture systems can most often respond flexibly to market requirements, and there is usually scope for adjustments and choice of alternatives in accordance with marketing needs. There is, however, much advantage to be gained by planning development from the marketing end to begin with.

In subsistence-level or small-scale operations limited to serving the dietary needs of a family or small community, there is usually no

Consumers and traders on the pond banks to buy tilapia harvested from a small-scale farm in the Central African Empire

marketing problem. The word is passed around, and the consumers or small traders flock to the fishponds or other installations to buy the produce as soon as harvested. The situation may be different if the species cultivated happen to be those with low consumer appeal, which will require product development, consumer education and demonstration marketing. In areas where aquafoods are not very popular, efforts may be needed to promote fish consumption and to educate consumers in their use and preparation for the table. These can often be included as an integral part of extension activities.

Marketing problems become more important in small-scale aquaculture when the production has to be distributed over a wider area to reach the consumers. This is also the case when the production units are scattered over a wide area, or when the production periodically or continuously exceeds the absorption capacity of the local market. While the dispersed location of production units bestows social benefits in rural areas, a concentration of such units in strategically advantageous locations can result in more ready access to markets, greater influence on market prices through concentration of supplies and coordinated harvesting, and economies of scale in production, storage, transport and processing.

In selecting marketing channels for aquaculture products, there are often many advantages in utilizing the general fish marketing system, if this is sufficiently well organized. There are benefits to be derived from integrated marketing; but care should be taken not to sacrifice the advantages that culture-fishery products may have over those of capture fisheries, such as marketing fish or shellfish in the live condition, or marketing them at the most preferred size, which may sometimes be below the legal fishing size as is true for salmon, trout and some molluscs like abalone. Besides, culture-fishery products can be harvested during the off-season for fishing of the species from the wild. Integrated marketing will thus ensure regularity of supplies, minimizing any disadvantages that cultivated products may have, such as consumer prejudice.

Marketing of fish or shellfish in the live state would require special facilities for transportation and holding in wholesale and retail markets. When they have to be processed before marketing it will undoubtedly be advantageous to link the production centers with transport, storage, preservation or processing systems of general fish marketing. This will allow fuller control of market outlets and prices, allowing greater marketing flexibility.

In small-scale operations, it is essential to ensure that the preservation and storage facilities are not too expensive, unduly raising production costs. In many circumstances a number of production centers can be served by the same preservation, processing and storage facilities, which could either be set up on a cooperative basis or be provided by a government agency. There is also the possibility of a private sector agency taking over the transport and marketing aspects of the operations. Such an agency can undertake collection of harvest from the production units, store, process if needed, and distribute to consuming centers. When such an arrangement is made, it is of particular importance to build in adequate safeguards to protect the interests of the small producers and to ensure that they receive reasonable prices for their produce.

The possibility of linking aquaculture production with agricultural marketing systems is usually limited because of the special requirements for the distribution of fishery products. But in cases where the volume of production is too small to warrant separate marketing arrangements, efforts should be made to utilize the services and management support of agricultural marketing organizations. This may be particularly relevant when aquaculture is integrated with rice cultivation, animal production, etc.

Environmental Effects of Aquaculture Development

Conflicts in land and water use. Although the sites generally selected for aquaculture are not directly used for other productive purposes, there may be other competing indirect uses for such areas and sometimes even direct alternative uses. Besides, aquaculture practices may conflict with agriculture, sport fishing and other capture fisheries, industrial expansion, navigation, water resource development, residential development or recreation. In some circumstances it may also be argued that the pristine beauty of an area may be adversely affected by access roads, powerlines and other requirements of an aquafarm. Comprehensive and integrated planning, reconciling conflicting interests where they exist, is necessary to enable the most beneficial use of the areas. Aquaculture does not necessarily require exclusive use of the total environment, and other uses can often be well accomodated.

There are at present no clearcut guidelines for decisions on the allocation of sites for alternate uses. Data for economic criteria, which can only be partially applicable, are not readily available. Many of the common assumptions on the ecological role of saline swamps, marshes, and similar areas that may be used for aquaculture purposes need critical evaluation. Judgments have to be made on a case by case basis using the best available data. Compromises will have to be made, taking into full account the positive role of aquaculture in the ecological management of land and water areas.

Aquatic pollution and other environmental changes. Aquatic pollution and large-scale modifications of the environment, such as water diversion, dredging and filling, may seriously affect aquaculture. Therefore appropriate control measures, where necessary, should receive attention in development planning. As aquaculture environments are generally maintained at a high level of productivity through the use of external energy subsidies, they tend to be ecologically very unstable and more easily perturbed than natural ecosystems. Pollution may be caused by agricultural, domestic and industrial wastes.

Most biodegradable organic wastes in limited quantities may serve as fertilizers, and add to the productivity of aquaculture facilities. The traditional use of human and animal wastes in fish culture is based on this. However, the use of untreated sewage may give rise to public health hazards, particularly when filter-feeding species are cultured; precautions have to be taken to ensure that the wastes utilized are free of harmful micro-organisms. The overloading of organic wastes, or the discharge of industrial wastes containing toxic substances into aquaculture waters can cause major problems. Overloading of nutrients may cause algal blooms, oxygen depletion, increased turbidity and other water quality changes. These may affect aquaculture production adversely and cause large-scale mortality of the cultivated stock.

Heated water effluents from power stations, though generally harmful to biota in tropical climates and in unregulated discharges into open bodies of water even in temperate climates, can be used beneficially for aquaculture purposes. The waste heat can be used to maintain the optimum temperature in culture installations at very little cost, and this could result in year-round growth and higher production through culture. For successful use of heated effluents from a power station, it will be advisable to make necessary provisions in the planning stage of the power plant in order to ensure a regular and controlled supply of the effluent, devoid of toxic elements such as chlorine which is frequently injected into the effluents to keep down the growth of fouling organisms and condenser slimes in the delivery pipes.

It is true that intensive aquaculture can cause some organic pollution as a result of the accumulation of metabolic by-products of cultured species and the biological oxygen demand caused by unutilized food, especially in restricted environments where water exchange is slow and the mixing process limited. But it will be inappropriate to apply arbitrarily the general animal waste regulations and pollutant discharge regulations, that may exist in a country, to aquaculture. Animal waste regulations are mainly directed toward the control of storage and disposal of highly concentrated wastes produced by feed lots for cattle or poultry. Such regulations are partly concerned with odor, which is seldom a problem with aquaculture. The wastes produced in closed or semi-closed systems like fishponds are constantly broken down and recycled by natural processes. There is a likelihood of some discharge of wastes from "flush-through" systems of culture, as in raceways and hatcheries. But it should be relatively simple to recycle such organic wastes through algal or other types of culture; or the effluents can be made harmless through stabilization or adequate dilution before discharge.

Well-planned aquaculture would include provisions for the biodegradation of its own wastes. The chemicals selected for use in aquaculture installations should be those that are degradable, and necessary precautions should be enforced to avoid any discharge of toxic materials. When using open bodies of water for aquaculture, such as cage or pen culture, due consideration has to be given to the possible effects on water flow, siltation, waste accumulation, etc., and suitable action taken to prevent deterioration of the environment.

[Edited extract from Planning of Aquaculture Development--An Introductory Guide; pp. 10-15, 18-27, 66-68; Fishing News Books Ltd., Addlestone, Surrey, Great Britain. Copyright© Food & Agriculture Organization of the United Nations, 1977.]

Selection of Fish For Aquaculture

Marilyn Chakroff

[This article describes some of the most common fish species grown in ponds around the world, and outlines their ecological requirements. Their usefulness for rural pond culture is assessed.]

After a farmer has a firm idea of his site and the types of ponds it is possible for him to build, he must decide what he wants to do with his ponds--raise fish for food, or run a fish-marketing business. The next step is to consider very carefully what type or types of fish he is going to raise in his ponds. The success of the pond depends upon choosing the species that will grow best in the type of ponds and conditions that the farmer is planning.

The best fish have certain characteristics which help them grow successfully in ponds. There are some fish which will not adapt to pond conditions and cannot be used in pond culture. A pond is very different from a natural waterway:

- There is usually no water flowing through a pond. Some fish need to live where there is a current in the water, rather than in a quiet pool of water.
- The food that is already in the pond is all that is available to the fish, unless extra food is put in by the farmer.
- There is only a certain amount of water and pond area in which to move about.

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Many governments today are introducing exotic fish species (kinds of fish not native to that country) into fish pond programs. They do this for three reasons:

- Some introduced fish grow better and faster than native fish.
- Some introduced fish are preferred by people over local fish for eating.
- The offspring of a cross between a local fish and an introduced fish sometimes exhibit hybrid vigor, which means that they might grow faster and taste better than either of the parent fish.

But exotic fish must be watched and used very carefully because exotic fish which escape from ponds can create problems in natural waters when they begin to compete with local fishes for food. Also, introduced fish can sometimes carry diseases or parasites that are fatal to native fishes. If at all possible, farmers should be encouraged to start their ponds using a tested pond fish which is locally available and is well-liked by people in the area. The important factors are that the farmer be able to sell any fish he wishes to sell, that the fish can grow in ponds, and that there is brood stock available locally.

Scientific and Common Names of Fish Used Widely Around the World in Pond Culture

Each fish has a scientific name which is always the same. The common name, however, can be different from one country to the next.

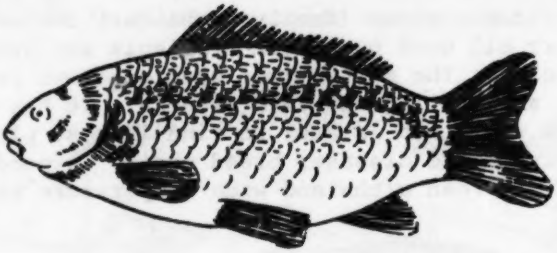
	Genus - species	Common name
1.	*Anguilla japonica*	eel
2.	*Aristichthys nobilis*	bighead carp
3.	*Barbus gonionotus*	tawes
4.	*Carassius auratus*	goldfish
5.	*Carassius carassius*	crucian carp
6.	*Catla catla*	catla
7.	*Chanos chanos*	milkfish
8.	*Cirrhina molitorella*	mud carp
9.	*Cirrhina mrigala*	mrigal
10.	*Clarias batrachus*	catfish
11.	*Clarias macrocephalus*	catfish
12.	*Ctenopharyngodon idellus*	grass carp
13.	*Cyprinus carpio*	common carp
14.	*Helostoma temmincki*	kissing gourami
15.	*Heterotis niloticus*	--
16.	*Hypophthalmichthys molitrix*	silver carp
17.	*Labeo rohita*	rohu

(Cont'd.)

	Genus - species	Common name
18.	*Mugil cephalus*	mullet
19.	*Mylopharyngodon piceus*	black carp
20.	*Osphronemus goramy*	gourami
21.	*Serranochromis robustus*	--
22.	*Tilapia macrochir*	tilapia
23.	*Tilapia melanopleura*	tilapia
24.	*Tilapia mossambica*	tilapia
25.	*Tilapia nilotica*	tilapia
26.	*Trichogaster pectoralis*	snakeskin gourami
27.	*Trichogaster trichopterus*	three-spot gourami

Important Pond Species

Common carp. The common carp, *Cyprinus carpio*, is a favorite warm water pond fish. Common carp are used as a pond fish because they: 1) spawn easily in ponds; 2) are disease resistant; 3) tolerate wide ranges of temperature and pH; 4) eat all kinds of food, from zooplankton to decaying plants; 5) have a very good growth rate; and 6) accept supplementary foods.



Common carp generally are a grey-green color but can also be gold, yellow, orange, pink, blue, green, or grey. They spawn all year round in warm waters, and they can be made to spawn by the pond owner if they do not spawn naturally. Common carp are good to eat when they are cooked properly. They can be grown in ponds by themselves (monoculture), or in ponds as a polyculture with Chinese or Indian carp. Some of the yields obtained by stocking common carp in monocultures are the following:

Country	Culture Methods	Yield kg/hectare
Czechoslovakia	Growth in ponds with ducks	500
Guatemala	Intensive culture in ponds	4,000
India	Natural growth in ponds	400
	Growth in ponds with management	1,500

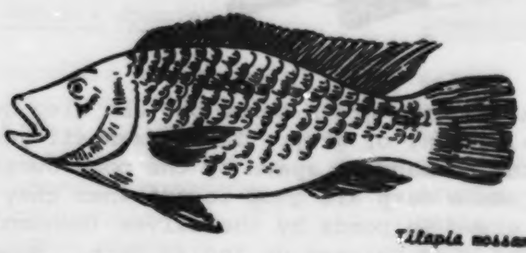
(Cont'd.)

Country	Culture Methods	Yield kg/hectare
Indonesia	Intensive culture in ponds	1,500
Japan	Intensive culture in ponds	5,000
Nigeria	Commercial culture with fertilization and feeding	371-1,834
Philippines	Intensive culture in stagnant water	5,500

Source: John E. Bardach, John H. Ryther and William O. McLarney, Aquaculture. New York: John Wiley and Sons, 1972.

Common carp are a very easy fish to breed, keep, and harvest, so a fish pond that relies on common carp will probably do well. Common carp are a good fish for a farmer to use for his first effort. With good management, common carp will continue to produce healthy eggs and fry until they are above 5 years of age.

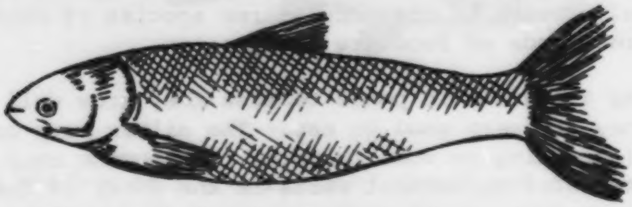
Tilapia. The Tilapia genus (family Cichlidae) contains at least 14 species, which are all good pond fish. Tilapia are generally dark brown to black in color. The most common species grown in ponds is the *Tilapia mossambica*, also called the Java tilapia. It has been introduced throughout the world and is easy to find in most places. Tilapia are hardy fish, resistant to disease; breed easily in ponds; grow rapidly; taste good; and can withstand wide temperature ranges.



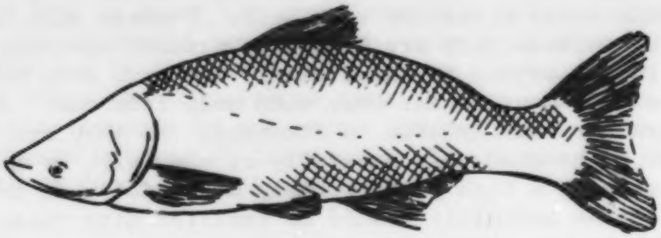
Tilapia mossambica

Tilapia are herbivorous: some species eat higher plants; some eat phytoplankton. Both the Java tilapia and the Nile tilapia *(Tilapia nilotica)* do well in very enriched waters (waters polluted by sewage). All tilapia have slightly different eating habits, depending on the species. They reproduce every month or so, once they become sexually mature, and take very good care of their own eggs and fry (i.e., young fish) in ponds. If a farmer plans to breed and raise fry, this fish is a good choice because the fish themselves take care of the fry at a stage where many fish of other species die easily. The major problem with raising tilapia in fish ponds is that they become sexually mature at a small size, and use their energy to reproduce rather than to grow further. It may be necessary to separate the tilapia by sex before they are old enough to reproduce. Or it may be necessary to introduce catfish into the pond to control the population of small fish. Tilapia species have many possibilities for pond culture that make them a good choice, particularly for the first-time fish farmer.

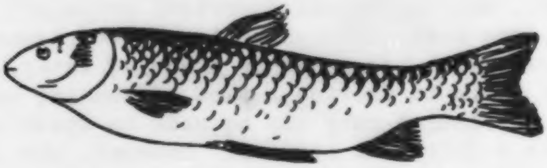
Chinese carps. Other kinds of carp besides the common carp often are successfully grown in ponds. Most commonly used are the Chinese carps. Some of these are:



- Silver carp *(Hypophthalmichthys molitrix)*. This fish eats phytoplankton, but will accept rice bran and bread crumbs. It is silver in color and has very small scales.



- Bighead carp *(Aristichthys nobilis)*. This fish feeds mainly on zooplankton. It is a dusty green color on top, which fades to a pale green color on the abdomen. It also has small scales.



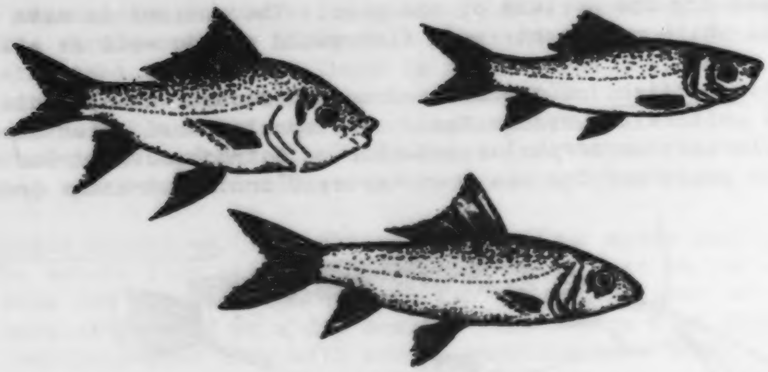
- Grass carp *(Ctenopharyngodon idellus)*. This fish is an herbivore and eats water vegetation (but also will eat almost anything). The grass carp is also silver-colored, but has a darker grey area along the top of the body. It grows larger in size and has larger scales than a silver carp.

Other Chinese carps like the black carp *(Mylopharyngodon piceus)* and the mud carp *(Cirrhina molitorella)* are bottom feeders. This difference in eating habits is very important in fish pond culture. It is the reason why polyculture, or growing a number of fish species in one pond, can be successful. When fish are stocked alone in a monoculture, the foods in the water not eaten by that type of fish are wasted. In a polyculture of the above three species of Chinese carp, for example, three kinds of food are being eaten.

Chinese carp are grown in ponds because they grow well in polycultures, and they are very good to eat. The silver carp grows faster and is tastier (according to some farmers) than common carp. The grass carp is most often used to control weeds in the pond; in fact, the grass carp does a better job of weed control than do chemicals. The grass carp is perhaps the most interesting of the Chinese carp and is now being studied by scientists in many countries to find better ways of breeding it in ponds.

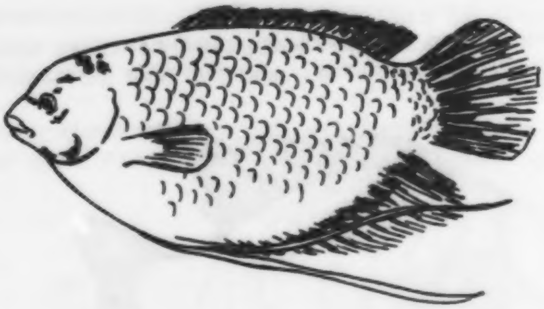
A farmer might run into problems raising Chinese carp if he does not look into his local situation very well. Farmers will have to have a source of Chinese carp fry from a government hatchery or a local breeder before trying to raise them. The carp only breed once a year, and then, in most cases, only with help from man. Also, Chinese carp are very susceptible to diseases. As they are delicate fish, they must be handled very carefully or they will be injured. A farmer just beginning a fish pond probably would not want to breed Chinese carp, but he certainly should be familiar with these fish and how they might help his ponds. For example, even two or three large grass carps placed in a pond with many fish of one or several other species could be valuable for keeping a pond balanced.

Indian carp. The Indian carp are the last group of carp often cultured in ponds. Indian carp are divided into minor and major varieties. The major carp of India are the catla *(Catla catla)*, and the rohu *(Labeo rohita)*, and the mrigal *(Cirrhina mrigala)*. The minor carp are the reba, the bata, the sandkohl, and the nagendram fish. The Indian major carp will not spawn in standing water, so special ponds are built in India to provide a flow of running water in which they will spawn. The Indian carp can be made to spawn in still water by man, but this is a difficult process. However, the Indian carp can be spawned where ponds can be constructed to provide constantly running water.



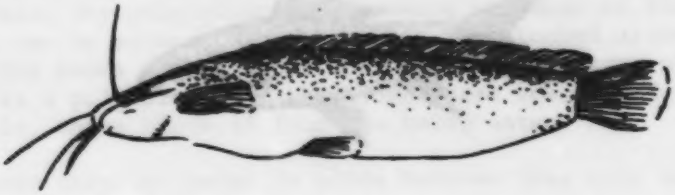
A farmer who has only a small pond should not try to breed Indian carp. Indian carp can be grown in polycultures with common carp, but are not as good or fast growing in ponds as the Chinese carp. Indian carp are also susceptible to many diseases. This is a fish for an experienced fish farmer who is interested in, and able to, experiment.

Gourami. The gourami *(Osphronemus goramy)* is originally from Indonesia, but now is grown all over Southeast Asia. Gourami possess an accessory air-breathing organ, which means that they can survive in waters that are low in dissolved oxygen. This makes it an important fish in areas where the temperature remains high and there is little water for certain periods of the year. Gourami: 1) spawn easily all year round in warm waters; 2) taste good; 3) are easy to breed; 4) accept a variety of foods; and 5) are hardy.



Gourami are good fish for a first-time farmer, and they are certainly a fish to be considered by farmers who live in areas that remain very hot and dry for periods of the year. The gourami is used to these conditions, while many other pond fish would not do well at all.

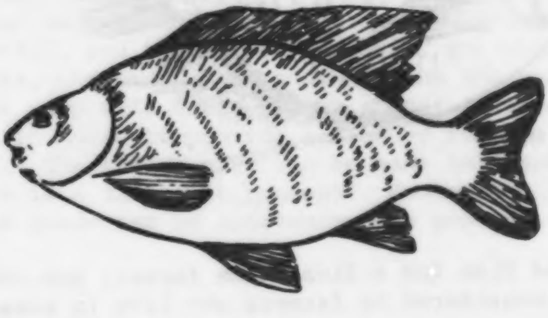
Clarias catfish. *Clarias* are found throughout Asia, India, and Africa, as well as the Middle East. The species most often used as pond fish are *Clarias macrocephalus* and *Clarias batrachus*. *Clarias macrocephalus* is preferred for its good taste; *Clarias batrachus* grows faster.



These catfish have accessory air-breathing organs; they can even crawl out of ponds to look for food. Because they can live in shallow ponds, these catfish are sometimes used in culture with rice. They are scavengers and will eat just about anything, but they prefer to eat worms, snails, and other fish. They are often used in polycultures with tilapia where they serve as predators on the very small tilapia. They will eat supplementary foods, and give very high production in ponds. In Thailand, *Clarias* catfish yield about 97,000kg/ha when they are fed supplementary foods. These catfish are hardy: they sometimes get external parasites, but these do not kill the fish.

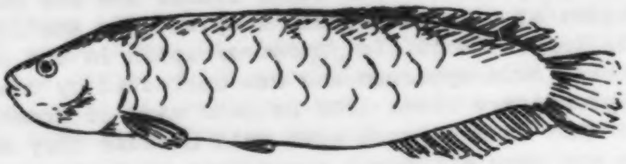
Catfish are another good fish to be raised in areas where high heat and long dry spells are found. They are good to eat, easy to keep, and can be used in ponds in a number of ways. Certainly a farmer who already cultures paddy rice might be interested in considering adapting his paddy to catfish culture.

Tawes. The common name tawes is applied to three species of fish--*Barbus gonionotus*, *Puntius javanicus*, and *Puntius gonionotus*. These



fish usually are used in fish ponds for vegetation control, in polycultures with Chinese carp. Tawes are able to spawn all year round, but they most often spawn in the rainy season. Tawes need well-oxygenated water with a strong current to spawn. Tawes feed on soft water plants, but will also take rice bran. There is not a great deal known about the tawes at present, but it can be used in polycultures when the grass carp is not available. A farmer starting a polyculture certainly might be interested in using this fish. However, first-time fish farmers with limited space would not want to try breeding this fish.

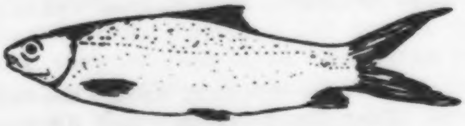
Heterotis niloticus. The *Heterotis niloticus* spawn easily in ponds. The mature fish will build a grass-walled nest in the weeds at a pond's edge and spawn inside this nest. They spawn when water is low and very warm at the end of a dry season. The mature fish feed only on plankton, but in a pond they will accept supplementary food. This fish has a swim bladder which can serve as an accessory air breathing organ.



There is not yet a great deal known about the *Heterotis niloticus* as a pond fish. But it seems that it is a good choice of fish for warm climates and warm waters. A farmer who lives in such a climate might find raising, and even breeding, this fish quite easy--particularly in a very well-fertilized pond.

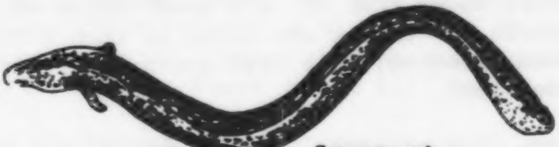
Milkfish culture. The milkfish *(Chanos chanos)* can be raised in freshwater even though it is primarily a brackishwater fish. Until recently, this fish had never been bred in ponds, but there have been successful spawning experiments in the Philippines. The fry are caught along the shoreline at breeding season (the rainy season) and transferred to freshwater ponds. Milkfish culture is done for the most part in the Philippines and in some other Southeast Asian countries, like Indonesia and Taiwan.

Acclimatizing the fry from the saltwater to the freshwater pond is hard to do; many fish die if the adjusting process is not done well.



Therefore, milkfish usually are cultured only in brackishwater ponds, that is, in ponds which are partly salt water and partly fresh; the use of milkfish in freshwater ponds is not widespread. Milkfish feed on a complex of bottom algae, and, recently, it is reported they also feed on phytoplankton. Milkfish are prized for their beauty and their good taste, though they have many, many small bones. This is not a fish for the first-time fish farmer. In fact, it is not a good choice for any farmer unless he has a saltwater pond or is interested in trying to acclimatize the fish to a freshwater pond, or unless he can buy milkfish from a source that has them already in a freshwater pond.

Eel culture. Eels (*Anguilla* sp.) have been cultured in Japan and Taiwan for years. They are very much a luxury food, and are not normally grown alone in ponds outside of these two countries. The eels are grown in ponds in polyculture with other fishes and are particularly useful with species of tilapia because they eat the smaller tilapias. The eels used in Taiwan *(Anguilla japonica)* spawn in the sea and the fry (called elvers) swim upstream and are collected by dealers. Eels must be fed supplementary feeds like pellets made of trash fish. It is not recommended that farmers work with eels because they must be fed protein and are not very efficient converters of food. Also, eels cannot be bred in fish ponds.



European eel

A Closing Note on Fish

All these fish have been and are now being cultured in fish ponds around the world. They are not the only fish which can be grown in ponds. In every area there are a number of fish in natural waters that could be grown in fish ponds. It might be a good idea to experiment with local fish in your ponds, to find those fishes that might be available to farmers in your area for use in their ponds. It is better, however, for an extension worker or government institution to do the experimenting than it is to have a farmer risk wasting his time or money, or even more importantly, risk failure; if a farmer fails, he may not want to try again.

[Edited extract from Chapter 3 of Freshwater Fish Pond Culture and Management pp. 33-52. Peace Corps/VITA Publication, 1978. Book can be purchased for $6.50 plus postage from: VITA, 3706 Rhode Island Ave., Mt. Ranier, MD 20822, U.S.A.]

Book Review

Julian L. Simon, The Ultimate Resource, Princeton University Press, Princeton, New Jersey, 1981.

Reviewed by Gordon Donald,
Editor, Development Digest.

Julian Simon has written a book that was intended to stir controversy and has done so. It takes a strong position in opposition to those who fear the effects of depletion of the world's physical resources and of rapid increase in the world's population. This puts him up against both geologists and demographers, whose predictions he denounces. He claims economists as his allies, though one may wonder how extensive such support may be. He is not merely combative but seems enthusiastic in his cause, which proclaims a positive view of people and their contribution to the world economy, and an optimistic outlook on the future for humanity. People are the "ultimate resource" of his title.

His thesis, outlined briefly in the beginning and elaborated in later chapters, contains these principal elements: the world's per capita food situation has been improving in the last 30 years; agricultural land has been increasing; natural resources including minerals, energy supplies, and forests "are not finite in any economic sense" (p. 5), and can be expected to become less scarce in the future because that has been their trend in the past; and people are the basic producers of economic goods, so that more population leads to more production. More people will also bring in more new ideas on how to produce more efficiently, and avoid possible shortages. It follows that one need not fear the effects of population increases outrunning the limits of the world's resources and reducing living standards. Nothing like that has happened so far, and it should not in his view be predicted. Simon does not, however, predict that population and resources will both expand to infinity together; he expects population increase to gradually slow down, while both resource availability and human ingenuity in the use of resources will be sufficiently elastic to support rising standards of living.

This would surely be a much happier future to think about than that which has been described in recent years by what appear to be the intellectual leaders in both the physical and social sciences. Simon also embraces a positive view of people as desirable economic assets which has appeal, especially when one loves children and wants to enjoy a positive feeling about them. But because his conclusions have such a strong and widespread appeal, it becomes important to examine Simon's way of reaching the results he is so eager to propagate, since the danger of wishful thinking is certainly present.

The Supply of Natural Resources

Simon's views on resource scarcity seem to this reviewer the heart of his overall thesis. If resources were indeed "not finite," one could view population numbers in a rather different way than one must if one sees resource limitations lying ahead--in fact, already present in some areas. Simon's treatment of minerals extracted from the earth is somewhat different from his handling of renewable vegetable-based resources, such as food and timber, but the concept of scarcity is important in both areas.

Simon begins by stressing scarcity of mineral resources as the key concept, rather than absolute amounts of materials present in the earth regardless of how useful they may be (pp. 17-25 present the gist of his argument). Scarcity, i.e., short supply in relation to demand, is revealed by prices, and increasing scarcity by rising prices. So far, no one could object. He then considers complications in the data on prices and concludes that the best prices to use for measuring scarcity are a material's price relative to "wages" (i.e., to the human effort needed to produce it), or relative to "the" consumer price index (i.e., scarcity compared to costs of other goods). One can object to Simon's unnoted assumption that U.S. wage movements and price indices have universal validity; if he had tried to find world wage and price measures, this would have affected his results.

Simon then emphasizes a distinction between forecasting scarcity by "economic" as against technological or engineering methods, and disparages the latter. Engineers, he alleges, estimate presently known resource supplies, extrapolate present rates of use into the future, and state that a given mineral will only last for X years. These predictions, he insists, have always been too low; he gives examples of several series of such estimates which were revised upwards year after year, proving how wrong they were. This record of incorrect forecasting of growing scarcities is contrasted with the movement in minerals prices (relative to wages and consumer prices), which he shows in a series of charts as exhibiting a declining trend since the early 1800s, indicating decreasing scarcities. He then argues that prediction should be based on past trends unless there is good reason to expect them to be reversed. And he finds none: the main reason for the decreasing scarcities he attributes to technological progress, and he sees this as continuing; therefore, science will keep on bringing mineral costs lower and lower into the indefinite future.

There are several problems with this description of forecasting methods. The engineering approach is presented in simplistic fashion, as is the meaning of the extrapolations that are used. The published figures for "proven reserves" that are better known, and the "probable reserves" that may be present in less explored areas, are understood by scientists and engineers to be conditional. Further exploration and drilling will reveal more resources (sometimes less than estimated); an increase in mineral prices will make it possible to extract profitably more materials from a given area of proven reserves; and technological innovations that make extraction processes cheaper will also permit more minerals to be profitably extracted from given reserves. The final conditionality refers to the rate of extraction: a given level of reserves will last X years only if it is extracted at the defined rate. But all these conditions can change, and with them the so-called "forecast" which is only a conditional statement that if there is no change in knowledge, prices, technology and use rates the following would be true; but if defined changes in these variables should take place, the results would be varied accordingly.

None of this is obscure knowledge; it is what any engineer or industrial expert should know. And it is, of course, not a purely technological method of looking at the future, but a mixture of technological and pertinent economic variables. Particular estimates of resource outlooks are the result of careful study of complicated variables, and they are necessarily conditional; everyone with industry experience expects the variables to change. Sometimes the direction and magnitude of changes are estimated, along with estimated impacts. Of course there are uncertainties and differences of opinion, and of course the future always brings some surprises. But Simon's characterization of the whole process of trying to define the outlook for a particular resource by using as much knowledge as can be mobilized is not only unjustifiably condescending but is also misleading.

What he recommends instead is to forget about all the facts that could have a bearing on the supply and demand outlook for particular minerals and to focus only on his long-run charts showing declining scarcities. He appears to believe that one should extrapolate the declining trend onward into the future without questioning it further, or investigating any pertinent particulars that could indicate changes in the trend. This is not economic analysis, but faith. Such an act of faith would hardly be justified, in this reviewer's opinion, by some of the very charts that Simon displays. For example, the relative price trends in four important minerals--coal, oil, iron and lead--are reproduced from his book (pp. 96, 97, 349, 350) and they appear less than compelling (see next page).

Simon, however, does not put all his faith in a decline of scarcity for every mineral. He allows for possibilities of increased scarcity in one or more by noting that technological progress can develop ways of substituting less scarce minerals for more scarce ones in some uses. If demand for copper should grow faster than available supplies, for example, then one can use aluminum for many of the same purposes. Such substitution is often useful (though hardly a novelty to metallurgical engineers), but it is not an automatic cure to the shortage problem if increasing scarcity is a general condition. Taking the pressure off one material by

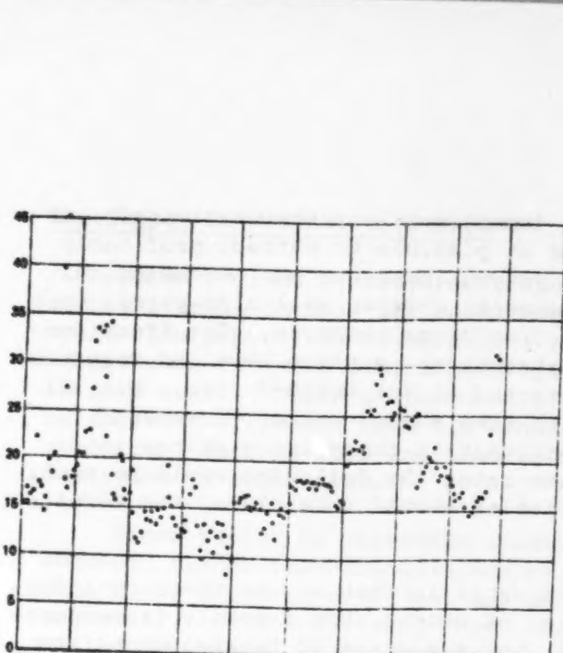


FIGURE 7-2b. The Price of Coal Relative to the Consumer Price Index

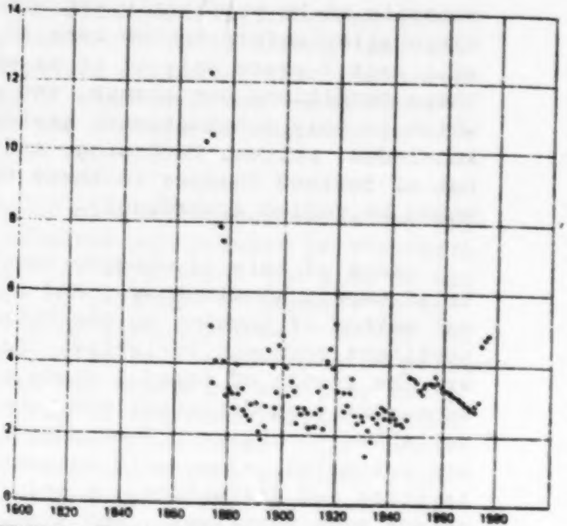
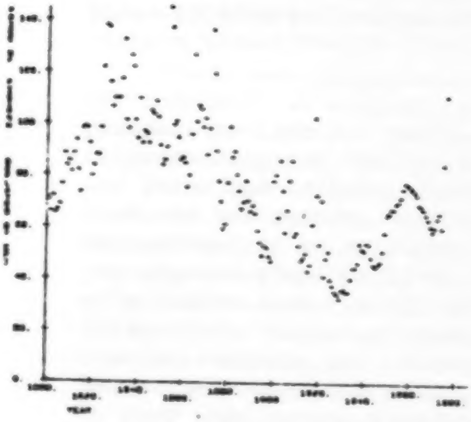
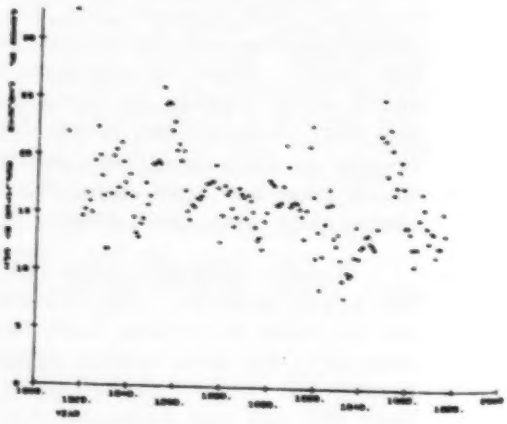


FIGURE 7-3b. The Price of Oil Relative to the Consumer Price Index



A-2. The Scarcity of Pig Iron as Measured by Its Price Relative to the Consumer Price Index



A-4. The Scarcity of Pig Lead as Measured by Its Price Relative to the Consumer Price Index putting it onto another is not always possible in uses where the qualities found only in one mineral are needed. Even where substitution can be done, it is only temporarily helpful if a number of related materials are all getting scarcer.

The most basic weakness in Simon's approach is that he seems to deny any possibility that mineral shortages in face of growing demand could ever become so general and acute that they could not be evaded indefinitely by scientific and technological change. When one considers how slowly minerals are formed in the earth (vegetable products are taken up next), and how rapidly demands for minerals have expanded in recent years as populations and incomes grew, it defies common sense to insist that there could never be a time when a number of the materials we use could become scarce. Granted that the usual conditional projections of mineral supplies cannot set a reliable date when some particular level of shortage will occur, it is hard to believe that a demand level increasing by multiples will not in time overload a mineral supply which cannot be added to, only discovered. Mines and oil fields are in fact constantly being used up and abandoned. Usually there are some materials left in them that could be extracted at higher cost; and these would be usable if scarcities and prices increased sufficiently. But these resources, too, have their limits in particular places. How can that which is true in particular known localities not also be true in all the other localities not yet explored?

In sum, Simon's treatment of nonrenewable mineral materials as being unlimited is not convincing. Judgments on when scarcities may appear for particular minerals require careful study and careful definition of what is meant by scarcity. Much more exploration of the earth is also needed. The problem cannot be wished away by reference to past trends.

One way out of an eventual mineral shortage condition might be to substitute vegetable or other products which can be expanded by man's efforts. Energy from fossil fuels could be replaced not only by wood but from renewable solar energy sources. Wood, along with new types of plastic from vegetable sources, supplemented by recycled minerals could replace our present uses of nonfuel minerals. New types of plants could be bred. Simon does not dwell on these matters; but such a scenario could fit in with what he expects from scientific advances if minerals should run short sooner than he envisages. Therefore Simon's treatment of food and forest production is an important ingredient in his optimistic outlook.

Simon attacks the food problem by first quoting various alarmist statements about impending famine, and then citing data published by the Food and Agriculture Organization of the United Nations (FAO) showing gradually increasing world food production per capita from 1950 to 1979. Substantial decrease in deaths from famine in the 20th century compared to the 19th is cited, due as much to improvements in communications as to those in food supply. Further increases in food production in developing countries could be achieved, he states, by stronger economic incentives to farmers. The high yields found in some countries, like Japan and Taiwan, are said to show what other countries could do. Price rises in some years in the 1970s, and decreasing world grain stockpiles, are treated as transitory and unimportant. Again, Simon gives credit to scientific advances, and denigrates the predictors of doom.

Turning very briefly to timber, Simon cites some increasing trends in tree productivity in one U.S. state, world increases in output, and the use of kenaf as a timber substitute for newsprint. As for agricultural land, here too Simon argues against those who fear the world is "losing ground." His main point is that there have been steady increases in the land area under cultivation in the world, and in all major regions except Western Europe and the U.S.; but in the latter two the gain in yields is more than the drop in area. Land diverted from farming to urban uses is defended as moving toward an economically superior use as shown in market prices. So land shortage is not a problem. He does not mention rising prices as indicating scarcity of land, or of wood products, this would weaken his argument.

Several objections must be made to this treatment of food, forests and land. While world per capita output of food has been increasing since 1950, the rate of increase slowed in the 1970s. In the developing world as a whole, and in many countries, food production did not keep pace with population, but increases in North American output have provided increased exports to all other regions--some of it paid for via soft loans, but most sold for hard currency. It is North America that is keeping up the world per capita totals, and it is not obvious that this kind of increase can go on indefinitely. As for forestry, the production from tropical areas is quite a different matter from that originating in controlled European and American forests. Progressive deforestation in Brazil and Southeast Asia, and the effects of overgrazing and firewood gathering by growing populations in the Middle East, North India and parts of Africa are reducing the future potential.

Concerning land supply and agriculture, the data on land area in cultivation tell nothing about land quality. To say that land quality is not a problem because average yields are rising is an inadequate reply to the "doomsayers" who see cultivation pushed into unsuitable areas with destructive results, who see creeping desertification in some areas, and creeping erosion from deforestation and poor farming practices in other areas. Increased yields result largely from fertilizer applications, generally used in the non-problem areas, while land degradation goes on simultaneously in other areas. Pressures to produce more from land can undermine land quality, not everywhere but in many areas; even in North America the loss of topsoil is becoming a problem. Actions to counteract land degradation are possible but costly; restoration of degraded land is still more costly. None of this would be attempted if Simon's attitude toward land quality prevailed.

In Simon's treatment of natural resources there are a number of side issues and quarrels with other authors which will be disregarded here. The most important aspect of his book is his basic thesis about the relatively unlimited nature of natural resources, given man's ability to devise new ways of extracting and using them. And here, he does not fully convince. He makes a number of valid remarks about the misunderstandings of other writers, and some useful points concerning the beneficial effects of market forces and responses to price changes in stimulating output. But in the end he cannot guarantee that good land will not be degraded, as history has shown that it can be. For the Roman empire 2000 years ago, north Africa (Libya and Algeria) was a breadbasket for the Mediterranean; today it is a food deficit area. Just as mines and oil wells do get used up, so does land--though the latter is not inevitable.

One of the principal causes of land degradation is the increasing pressure of demand for food to meet the needs of growing populations. Where the land under cultivation is expanded in the wrong areas using wrong methods of management, the potential for future expansion of production will be set back. Market forces alone have not prevented this from happening, indeed they often accelerate the process because of the short-run focus of participants. Increasing dependence on imports from North America, the current trend shaped by markets, is not a panacea for the indefinite future.

The extent to which mineral or vegetable-based resources become scarce at future dates will depend partly on whether science, good management of resources, and peace (rather than war) will allow production to increase sufficiently to meet growing demands. But it will also depend on the rate at which demands are growing, with population increase as the chief cause. This brings us to the subject of population growth which occupies the second half of Simon's book.

Population Growth

Simon's treatment of demographic subjects has a few novel elements in it but is not as divergent from prevailing views as his treatment of resources. To be sure, he quarrels extensively with those who wish to campaign for the spread of family planning, and he talks as though he were confronting established opinions. However, the confrontation is less in technical analysis than in policy prescription.

Some of his nonconventional ideas derive from his view of people as a positive economic resource, being the necessary producers of goods and services. He objects that the accepted models for projecting the effects of population numbers on economic growth ignore this key fact, and concentrate on negatives in the relation of people and output. The most important of the conventionally accepted negatives is that people with larger families are assumed to consume more and save less, thus lowering national savings and investment and subsequent output. Further, the national investment will have to provide more infrastructure, like schools and housing, to accommodate larger families, leaving less for productive investment. Agricultural land will have to supply more domestic food, leaving less area for export crops, thus increasing foreign exchange constraints to growth. An economic model embodying these relationships is certain to result in a negative impact of population increase on national growth rates, Simon points out.

Simon has produced a model more to his taste (described briefly on p. 279 and more fully in an earlier book). In it he assumes that increased population stimulates production by increasing demand; and families with more children devote more hours to work rather than leisure. Capital in agriculture is produced solely by labor in the off-season; capital in both farming and manufacturing increases proportionally with the labor force; economies of scale also rise with the labor force. With these ingredients, along with more conventional ones, his model indicates that a moderate population growth will produce a higher per capita economic performance in the long run (after 120-180 years) than either a slower or a faster growth rate, although in the shorter run (up to 60 years) the slower growing population performs better. A declining population does poorly in the long run. This model thus favors slow growth for a period up to 60 years--a long time for today's fast-growing poor countries.

Some of Simon's assumptions may be reasonable. In a sparsely populated country where labor is a bottleneck to farm output, his case is strongest. In more complex industrial economies the choices among assumptions are more debatable. Certainly more research is called for to determine what kinds of assumptions and coefficients are appropriate under what conditions; it is not reasonable to expect one model to function equally well in all societies. Simon's simulation results are most plausible where ample resources for economic growth are available to be mobilized by increasing numbers of people as they appear. This has a bearing, for example, on his contention that immigration (legal or illegal) is beneficial to the U.S. economy, a view with which one can sympathize. This result would be harder to prove, however, in a country like Haiti.

Simon reaches around for a variety of arguments to show that population density is beneficial to health, welfare, progress, and so on, that it is not a kind of "pollution." Here he gets tangled up in efforts to deprecate the claims of environmentalists generally, or to identify levels of progress with roads per square kilometer, efforts that may be questioned. But he has some more solid arguments relating population increase to economic growth.

One of his major points is that the "population explosion" in Europe took place at the same time as a "development explosion." However, he sees development as having eventually caused birth rates to decrease to their present low levels. One explanation of the simultaneous explosions may be that people make special efforts when they see a special need, and that population growth was such a challenge by increasing the need for income in families and groups. Conversely, when population growth slackens, so do economic stimuli (p. 261). Faster population growth, he maintains, increases mobility in the work force (p. 263) and facilitates economies of scale. Another argument he uses is that as more and more people become educated, and more go to work in research and development, more and more new ideas for technological improvements will result (p. 262). These points seem to be at the heart of his contention that he has refuted the pessimistic Malthusian predictions that increased population growth will depress economic levels.

When Simon applies this reasoning, based on observation of the "more developed" countries, to the less developed (LDCs), he does so largely through the use of the economic-demographic model described earlier, and by some very generalized argumentation. He has no doubt that additional children influence LDC economies positively by causing people to work harder and invest more, and by inducing improved infrastructure and scale economies, although they may cause some "temporary increase in costs" (pp. 285-6). It is here that this reviewer finds it necessary to object. Many of Simon's points about the biases in past models and the potential contributions of population growth to economic expansion in Europe and North America seem to me to have merit (they are not wholly different from what others have said). But he gives no recognition to any differences between conditions in LDCs and conditions in Europe and the U.S. He concludes in effect that, since population growth is good for development in all situations, there is no reason to favor family planning. He goes on to argue at length against the individuals and organizations that propagate birth control, exhibiting the zeal of a convert to the cause.

There are two kinds of difference between LDCs and the Western nations that are pertinent to the results of population growth. One is the difference in the present resource situation: conditions in the U.S., for example, would make it plausible to assume that additional population (e.g., unskilled immigrants from Mexico) could find ways of making a living, mobilizing resources, educating children, etc., even though there were at the same time unemployed Americans who were failing to do this. But the conditions in, say, Haiti or Bangladesh or Ethiopia are very different, and it is difficult to accept for them the same positive relationships of increased population numbers with economic growth that Simon has been emphasizing. Millions of people in these countries are already underemployed and malnourished, with many seeking to emigrate; yet additional Haitians, Bengalis or Ethiopians would require food and other necessities. The Malthusian problems that Simon claims to have vanquished will not vanish so easily. His continual references to U.S. illustrations for the points he makes in his book, while perhaps natural for an American writer addressing American readers, suggest that he does not perceive as realities the resource limitations that are found in much of the Third World.

Simon would presumably object that Western countries were once poor themselves, but then became richer and also more densely populated; so why not the LDCs? This brings us to the second difference between LDCs and the West: during the 19th century, when Western countries were in a stage of development roughly comparable to many LDCs today, the scale and timing of population trends were significantly different. The decreases in mortality rates in Third World countries in recent years were much more rapid than anything that occurred earlier; decreases in their birth rates, although faster than in Europe in some cases, have generally lagged behind mortality rates; this has resulted in unprecedented rates of population growth. Furthermore, the numbers of people experiencing these rates of growth are far beyond any previous numbers, and with each generation the multiplication moves onward. True, the rate of global increase has recently begun to moderate; but the numbers involved continue to rise and will continue to do so for some time. And these numbers are what is responsible for the rising demands on resources.

Simon has called attention to some of the more exaggerated statements on resource limits, but he cannot wish the limits away entirely. This would be less important if the numbers of people in Third World regions were not rising on such a scale. Simon ridicules some of the predictions of population that turned out to be wrong, and suggests that such things may be unpredictable. But inaccuracy in particular forecasts is overshadowed by the facts on population numbers already in being, and the existing trends in their components; there is limited scope for probable shifts in these trends. Simon cannot reshape these population numbers and trends, any more than he can abolish mineral limits and land use constraints. Under these circumstances, his diatribes against family planners are out of place, and indeed potentially harmful in areas he seems least acquainted with.

In sum, Simon has given us a fresh look at some old problems, presented in a lively style that is sometimes entertaining and at other times irritating and amateurish. He calls attention to exaggerated and foolish statements by his opponents, and makes various legitimate points along with questionable ones. But his attempt to build a positive case for his views does not, in this reviewer's opinion, carry enough weight to convince those who are not already on his side.

It may be that the capabilities of science and improved management of resources to generate economic growth commensurate with the population growth that lies ahead have been generally underrated. One can only hope so. But the outcome that everyone wants will not be brought about by efforts to find ways of making unwelcome facts look less threatening. It will, instead, be the result of facing up to difficult conditions and devoting hard work and thought to dealing with them.

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